



FRIDAY, DECEMBER 2.

NEWS OF THE WEEK.

We give below, in a condensed form, the leading news items of the week. These items will be found in detail in their appropriate columns.

Meetings Next Week.—Lehigh & Hudson River; Pittsburgh & Connellsville.

Elections.—Kansas City, Fort Scott & Gulf, J. R. Hardy, Superintendent.—Oregon & Transcontinental Central, Sidney Dillon, President.—South & North Alabama, H. F. De Bardelaben, President.—Tucson & Globe Northern, W. C. Culver, President.—West Virginia, Kentucky & Tennessee, A. B. Stone, President.—Wisconsin Central, F. W. Fratt, Chief Engineer; A. A. Allen, General Superintendent. Cairo & Northwestern, C. O. Patier, President.

New Companies Organized.—Broadway, Berkeley & Piedmont is incorporated in California.—Fresno City, Belmont & Yosemite has been incorporated in California.—Isbell & Iron Mountain files articles in Alabama.—Johnsonburg is incorporated in Pennsylvania.—Kansas City & Memphis files articles in Arkansas.—New Orleans, Mexia, Cleburne & Northwestern is formed in Texas.—Seattle & Eastern Construction Co. files articles in Washington Territory.—Springfield, Streater & Chicago files articles in Illinois.—State Line & Middlesex is incorporated in Pennsylvania.—Transcontinental Development Co. is incorporated in California.

Changes and Extensions.—Alabama: Columbus & Eastern is completed to Sylacauga.—Kansas: Union Pacific opens 37 mile extension. Kansas City, Wyandotte & Northwestern is completed to Seneca.—Montana: Helena, Boulder Valley & Butte is extended to Calvin.—Ontario: Canadian Pacific is finished to Sault Ste. Marie.—Wisconsin: Chicago & Northwestern will extend track to Delavan.

Traffic.—Anthracite coal shipments for the week ending Nov. 19 show an increase of 3.6 per cent., as compared with the same period last year; bituminous shipments show an increase of 25.9 per cent. Anthracite coal shipments for the week ending Nov. 26 show an increase of 8.0 per cent., as compared with the same period last year; bituminous shipments show an increase of 27.8 per cent. Cotton receipts, interior markets, for the week ending Nov. 25, show an increase of 7.3 per cent. as compared with the corresponding week last year; shipments show an increase of 11.6 per cent.; seaport receipts show a decrease of 11.0 per cent.; exports show a decrease of 12.0 per cent.; cotton in sight is smaller than at the same date last year by 1.6 per cent.

Miscellaneous.—Rutland road is sold to the Delaware & Hudson Canal Co.

Contribution.

The Use of Heavier Rails.

LONDON, Nov. 16, 1887.

TO THE EDITOR OF THE RAILROAD GAZETTE:

Your issue of Oct. 21 is to hand with an account of the Roadmasters' Association Convention, and a discussion on the above subject.

As I opened the question two years ago by producing the communication to the Institute of Civil Engineers here, "On Rail Joints and Steel Rails," which suggested the use of a 100 lb. rail, and this having been fully discussed in your columns, it cannot but afford me great satisfaction to find that nearly all the engineers now join me in recommending the use of heavier rails. Indeed, several of the speakers adopted as their argument the very terms used by me in that paper, which was published both in your journal and in several others, so I should require no more satisfactory result of my efforts to obtain an improvement both as to safety and as to the economy of the track.

On this side the question has progressed equally satisfactorily. The Goliath rail, 105 lbs. per yard, is again rolled at Seraing for the Belgian State, the trial having turned out satisfactorily, and the German state railways are now considering the question of using heavier rails. In the remarkably short period of two years I think a great advance has been made. Nevertheless, my ideas were considered bold when I first opened the question of using a 100-lb. rail. The first credit belongs to the Belgian State railroad, both for adopting the same and for giving me ample acknowledgment in consultation. I cannot but observe that neither the President nor any of the speakers at the Roadmasters' Convention have mentioned my name in connection with the proposed alterations, and my fear is that the cause of such an omission might not be an oversight, but that I have by some means offended either one or the whole body of the engineers by entering into private conditions during these discussions. I can only say that I have been careful to avoid statements relating to private interests and also in avoiding offence to anybody personally or to either makers or engineers as a body. But facts must be put forward, as nothing else would move or prove existing conditions, and, therefore, offence cannot always be avoided. I beg through your columns to assure them that if such is the case it has been done without the slightest intention, and that my only aim has been to do a public good both in the states and in Europe.

Notwithstanding that we may consider the main question of weight settled, there is a very important supplemental question to be decided, namely, where is the safety in the

hardness of steel rails to be? We know that the harder steel will wear better than the softer, and that some elements of hardness make the steel brittle. One of the speakers at the Convention said that his rails were so brittle that, in unloading them from the car to the soft ground, several of them broke, and he remarked further that those rails might wear well but could not be considered safe. It is very tempting to prescribe harder rails without increasing the weight; but what would be the result if the limit of safety were to be overstepped? This is really a subject for a new paper, and I very much wish that some one would take it up and find where the safety in the hardness of steel rails is to be fixed. Not only does this subject touch upon the private interests of makers, but upon different compositions of steel in different districts and different countries, and it involves the necessity of a large number of analyses being made from independently taken samples. In fact, the chances are there much greater of offending private interests than they have been in the question of heavier rails; and therefore I would rather see it done by some one else.

Thanking you individually for your courtesy and support, I now withdraw from the conflict quite satisfied with the results gained.

C. P. SANDBERG.

The Westinghouse Brake.

PHILADELPHIA, Pa., Nov. 28, 1887.

TO THE EDITOR OF THE RAILROAD GAZETTE:

I have kept pretty close track of your accounts of the various brake trials, and felt pretty well prepared for the superb achievements of these latest exhibitions; but after all the seeing with one's own eyes is vastly different from cold paper and ink, even where the paper is as smooth and the ink as black as the *Railroad Gazette's*. I have now seen the actual thing done, and my admiration is even greater than before, so I take the liberty of sending you some of my notes, in the hope that they will enthuse others. I confess I had, in common with many wiser than myself, a feeling last May that air could not compete with electricity, but evidently Mr. Westinghouse had noted a few facts about air pressure that the rest of 'em were not familiar with.

The first surprise was the ease with which the stops were made. I had read that a speed of 20 miles an hour could be destroyed in a hundred feet or so, and thought I understood the fact; but I expected to hear the creaking of the brake shoes and the other evidences of excitement which usually accompany quick stops. To see the long train stop within the length of three cars without any commotion, made me almost disbelieve my eyes. Then on the 40-mile-an-hour stop I was surprised again at the inadequacy of the opinions I had based on mere hearsay. I thought I knew how short a time 20 seconds was, but I didn't. When one is in a train which is unexpectedly and quickly stopped, he naturally revolves in his mind numerous queries as to the cause of the stop and the possibilities of danger. I boarded the 50-car train for the 40-mile test, and when the brake was applied I looked out of the window so as to see how much time there would be for one to indulge in speculations about the possibility of butting collisions, burned bridges, etc., and upon my word the notions in my mind had not made half a revolution before the train was as motionless as though it had been standing there a week; and I am not so brave but that I think with average swiftness under such circumstances.

The curious thing about the breakaway tests was the wonder expressed by old railroad men at them; men who certainly know how to read and presumably have kept posted on what has been done in the railroad world, seemed to be ignorant of this cardinal principle of the automatic brake and to regard the stopping of the rear portion of the train as something new. But the race was the feature; the use of sand and the increased leverage brought back the old familiar concomitants of quick stops; dust sparks and smoke created a great smudge. A spectator would naturally expect a good performance; but he had no time to formulate his expectation. As in the 40-mile stop, the train was at a standstill before any connected thoughts were recognizable in the mind. Many station platforms are about 500 ft. long; any one familiar with the passage of express trains past such places can get some idea of the astounding work done by this brake, if he will imagine the average express train running at full speed on reaching the platform and stopped still before the headlight reaches the further end of it. If a three-track road could be made available, and the hand-brake trial (in which the cars continue to run on and on, in an apparently helpless manner, which is only too familiar) performed simultaneously with the old and new air apparatus as tested here, the exhibition would be perfect.

J. R. C.

The Claim Agent.

TO THE EDITOR OF THE RAILROAD GAZETTE:

I have read with much interest your editorial on the Freight Claim Department, in your issue of Nov. 4, and the letter of a "Sufferer" in that of Nov. 11.

There is so much to be said upon both sides of this question, the field is so broad, that it is difficult to cover the ground in a short article. The views expressed in your editorial will certainly meet with the approval of all fair-minded claim agents. There can be no question but that the delivering road should promptly settle all overcharges upon the basis of the rate named in the bill of lading and not keep the claimant waiting while authority is obtained from the various lines interested in the shipment. It may be said, I think, that the drift of sentiment is toward this reform, and the "cranky" roads will soon be forced to agree to it.

The claim department being a new departure in railroad-

ing, it has not yet taken the rank or been given the importance in the minds of the general officers that it must eventually obtain. The claim agent is expected, while handling perhaps five times the mail of older departments, to do so with a few clerks and inadequate space. He should, as you say, keep constantly stirring up his agents and connecting lines, to return papers. His record books should be gone over once a week and slips sent to neglectful claim agents, superintendents or local agents calling for return of papers; but who will say that this is possible with the limited space and clerical force allowed him, when he has perhaps thousands of papers out under investigation? When the importance of this department is better understood, these facilities will be furnished. But how is a good claim agent to make himself appreciated by his superiors? If he pays all claims promptly upon their merits, disdaining to take advantage of restrictions in the bills of lading, and is governed strictly upon the equity of each case there is no praise for him from the public; at the best there is but an absence of complaint, and even that cannot be expected, for the decisions of the Angel Gabriel, Solomon and Haroun al Raschid rolled into one claim agent would not satisfy some shippers.

The prosperity of the road, its increase of tonnage, the absence of litigation are not credited to his efforts, and the year's total of his payments being large he is, if not reprimanded for loose expenditures, looked upon with disfavor as perhaps incompetent. On the other hand, if he tries to save his road by standing strictly upon the terms of the bills of lading, a perfect deluge of complaints to his superior officers, from the president down, falls upon his devoted head, and he would soon be obliged to change his course or resign.

During an experience of 12 years in the handling of claims, I have found a great change going on in the minds of officers having charge of them. This is more marked with the great lines than with the small ones, and it is these latter, in many cases irresponsible, lines that cause most of the delays and trivial exceptions and objections that so justly aggravate shippers. These latter do not know how often the claim agent of the receipting or delivering line, indignant at the delay he has been obliged to father, has issued a voucher and assumed a charge which his road was in no way responsible for, rather than have the claimant suffer any longer such an injustice. The cure for all this is in the line of your suggestion of claim agents' associations and the establishing of plain rules for the locating of liability so that correspondence and the necessity of asking for authority with the danger of pigeon-holing may be avoided. Steps to this end have already been taken, and while some roads whose officers have not given the matter sufficient consideration and who do not seem to realize its importance hang back, the prospects for the future are bright, and self interest if nothing else must bring them in.

The Claim Agents' Association of the Middle and Southern states, though only formed last spring, includes a large number of roads in New York, Pennsylvania, New Jersey, Delaware, Maryland, Virginia and North Carolina, and committees are working to establish equitable rules that will be acceptable to other associations in the Southern and Southwestern states, so that all may work in harmony and thus avoid delays. This association, it is hoped and expected, will soon embrace all roads in the Middle, Eastern and Southern states and eventually agree upon equitable rules with similar associations in the West. At the meetings which have so far been held, claim and commercial questions have been discussed with a breadth and liberality which could not but have been pleasing to shippers had they been present, and I do not think "Sufferer" need have any apprehensions from this cause.

Railroad men worthy of the name fully recognize the errors of the past and that the arbitrary acts of some little men dressed in authority have very unjustly imbued the public mind with the idea that shippers have no rights which railroad companies are bound to respect. In the present era of enlightenment, if shippers will only agree that railroads have some rights which they are bound to respect, and act toward them in the manner they would act toward each other in business matters, courtesy would be met with courtesy and consideration with consideration. Such at least would always be the case with one

CLAIM AGENT.

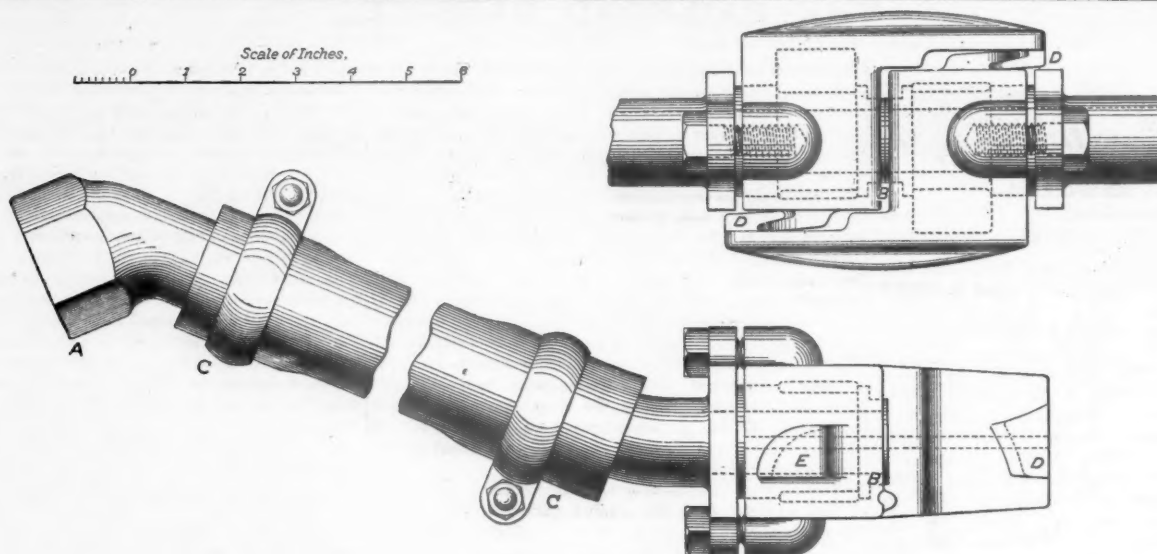
Couplers for Continuous Steam Heating.

The accompanying illustrations represent nearly all the couplers now in use for the continuous heating of railroad cars by means of live or exhaust steam from the locomotive.

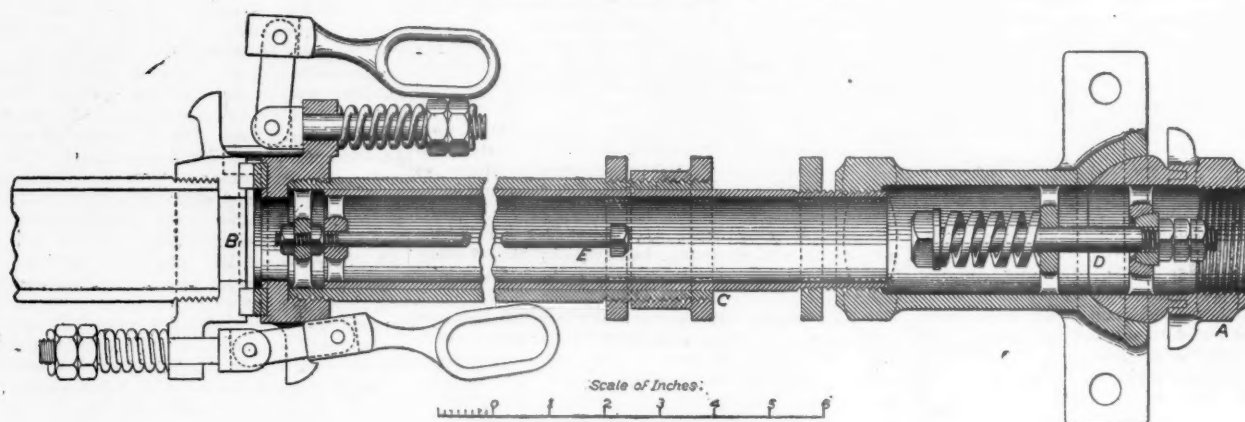
All the engravings have, with one exception, been made from actual couplings kindly loaned to us by the representatives of the various continuous steam heating companies. As far as possible the couplers are all engraved to a uniform scale, one-third of the actual size, and are chiefly shown in section, in order that their construction may be easily understood. The various systems of heating employed have been illustrated or described, more or less fully, in various previous issues of the *Railroad Gazette*, to which we may refer our readers. The various couplings may be briefly described as follows, and as the drawings are very clear, little description is needed. The different couplers are described in the order in which they are classified:

SEWALL.

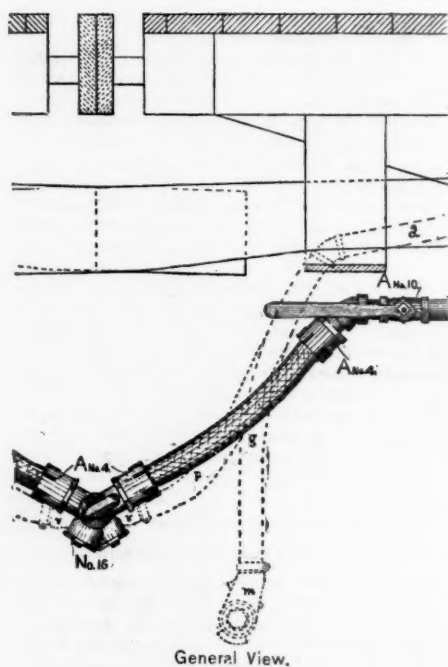
The body of this coupler is made of cast iron. As shown by the dotted lines, an external rectangular case surrounds a circular nozzle, one end of which is attached to the hose and the other end of which bears against the packing ring. The space between the two is filled with mineral wool or some other suitable non-conducting material. A small hole in the bottom of the outer case allows any condensed moisture to escape. It is not, however,



THE SEWALL COUPLER.

In use on MAINE CENTRAL and many other railroads.

THE MARTIN COUPLER.

In use on NEW YORK CENTRAL and many other railroads.

THE GOLD NO. 2 COUPLER.

In use on CENTRAL OF NEW JERSEY and other lines.

intended that this hole should act as a trap or allow any large amount of leakage, as Mr. Sewall believes that this is objectionable, as the drip is likely to fall on the Westinghouse brake coupling and freeze there. The special claim made for this coupling is that the surfaces making the joint are butted together and do not rub on one another in the act of coupling. It is claimed that this will prevent wear, and always secure a tight joint, which is, of course, the most important feature in a coupling.

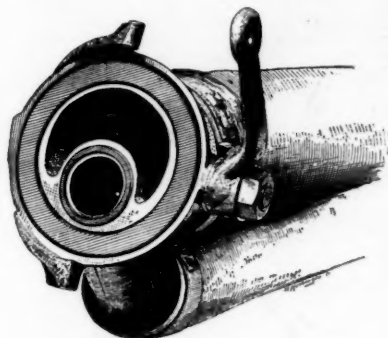
In the drawing A, is the junction with the main pipe, B is the point of junction of the two couplers, C C is the hose,

D is the engaging lug on the arm of the coupler, and E is the corresponding lug on the body of the coupler. Both lugs are undercut, so that the coupler cannot pull apart laterally. The weight of the coupler keeps it coupled, and when the hose are pulled straight, the coupler parts.

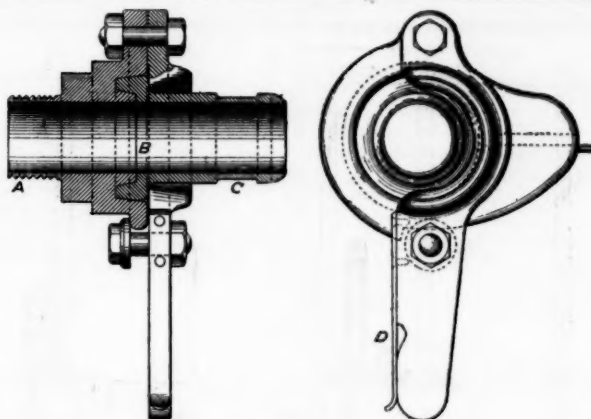
MARTIN.

In this coupler the surfaces making the joint are also butted together, and are held together by two hinged levers which pass over suitable lugs having recesses in which the levers engage. The levers are connected to spindles actuated by spiral springs. The tension of these springs con-

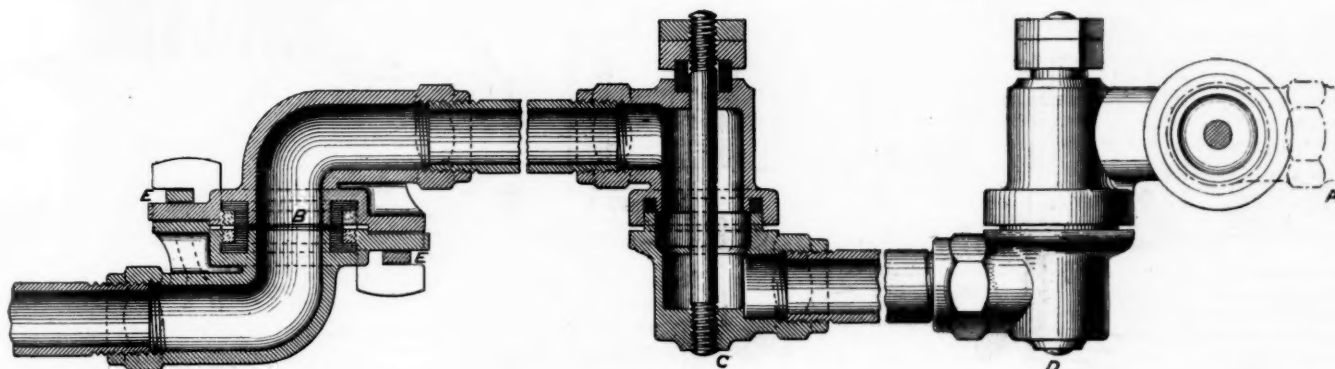
sequently tends to keep the couplers together. By means of cords attached to these handles the couplings separate when the train parts. This coupling, as shown in the drawings, is used in connection with a metallic substitute for a hose. It has a ball joint, the male spherical surface of which is formed of Babbitt metal, while the sliding surfaces are of brass. A long safety bolt E prevents the sliding parts being pulled apart, though it is sufficiently long to allow of considerable motion. The upper handle in the engraving is in the position when uncoupled, and the lower handle is in a coupled position. A shows



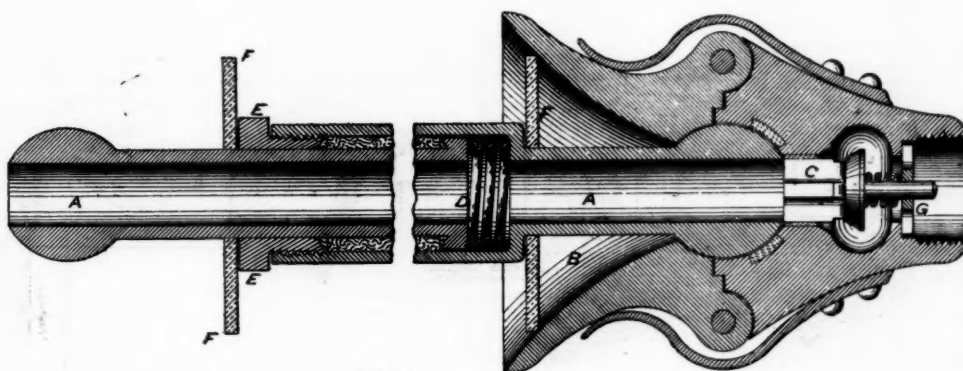
THE WILLIAMS COUPLER.
In Use on CENTRAL VERMONT.



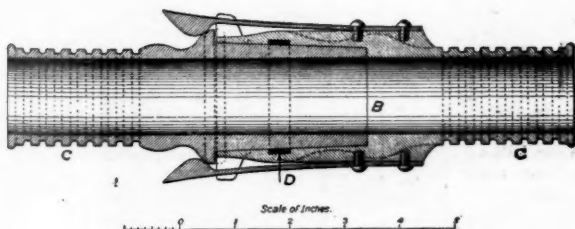
Scale of Inches.
THE EMERSON COUPLER.
In Use on CONNECTICUT RIVER RAILROAD, etc.



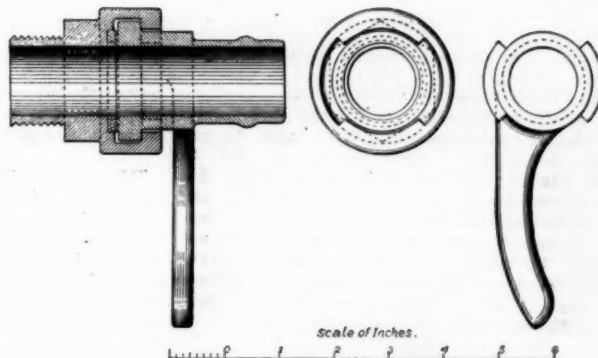
Scale of Inches.
THE MCGEE COUPLER.
In Use on NEW YORK, NEW HAVEN & HARTFORD.



THE PENNYCUICK COUPLER.



COUPLER.
In Use on BOSTON, REVERE BEACH & LYNN.



Scale of Inches.
THE HITCHCOCK COUPLER.
In Use on CONNECTICUT RIVER RAILROAD.

where the coupling is screwed to the main pipe under the car, *B* is the point where the two couplers make the joint, *C* is the sliding joint, and *D* the ball joint.

GOLD NO. 2.

This coupling is provided with a trap, and is intended to be used with a hose. To effect a coupling, the hose are handled in a somewhat similar manner to that employed in coupling Westinghouse brake hose, though the mechanical means of effecting the coupling are totally different. An arm *N* on one coupler raises up a spiral inclined plane *A* on the other, and so clamps the two couplers forcibly together. The trap is formed by a small metallic case *F* partially filled with alcohol, which is vaporized by the heat of the steam and presses the ends of the case out, closing the aperture to

the atmosphere. When the steam condenses and the temperature falls, the ends of the case collapse and open the passage to the atmosphere, allowing the water to escape. The distance between the case *F* and the outlet to the atmosphere can be regulated by the screw plug *H*. Should the trap allow steam to escape, this plug is screwed up, diminishing this distance so that the trap will only blow off at a low temperature.

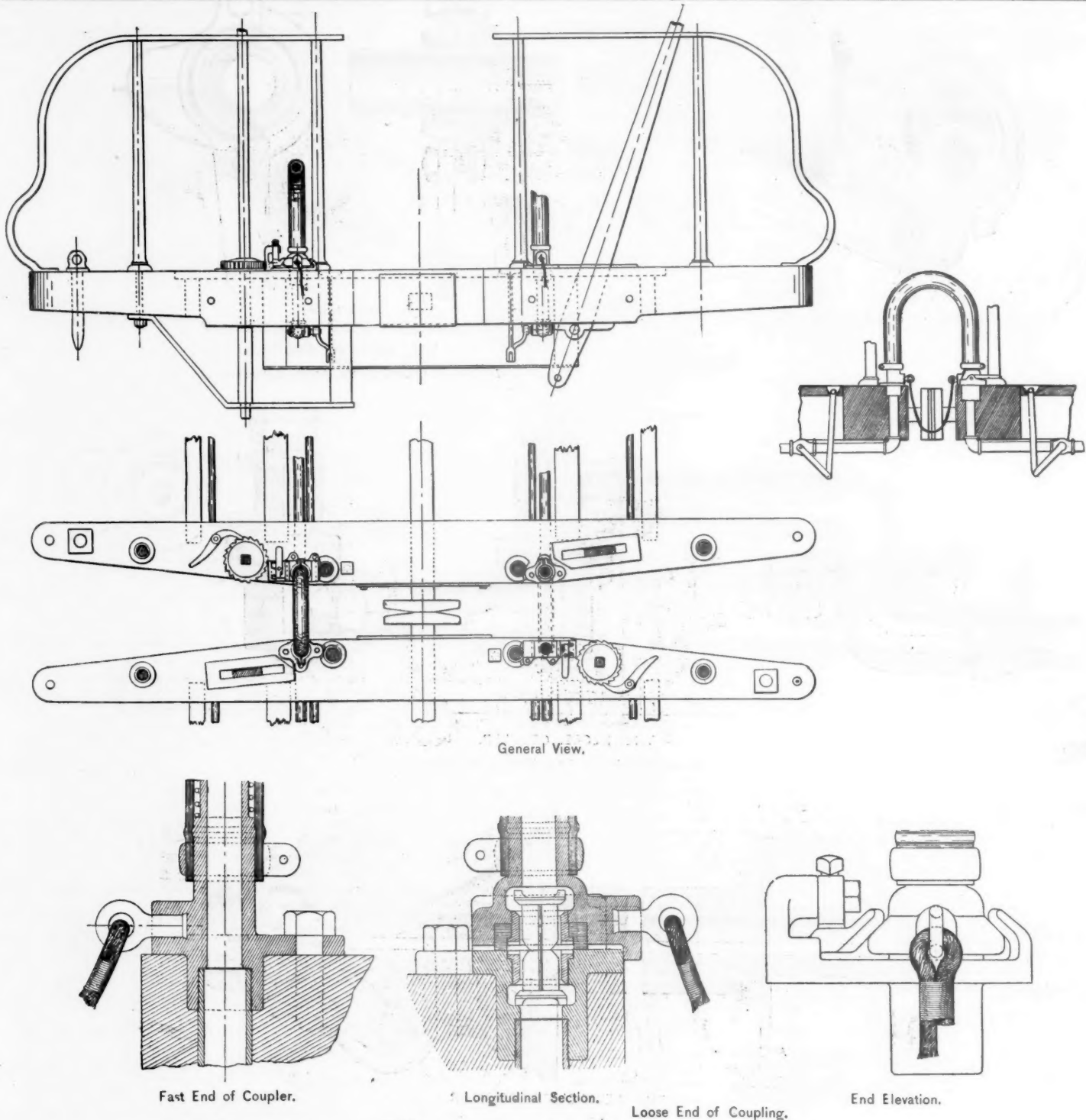
The method in which the hose are fastened to the coupler is specially designed to prevent the hose being blown off when the rubber becomes softened and expanded by the combined heat and moisture of the steam.

In the illustrations *A* is the spiral inclined path, *C* is the packing ring making the point between the two couplers, *D*

is the hose nozzle, *F* is a thin brass case partially filled with alcohol, and forming a thermostatic trap to let off condensed water, *H* is the plug regulating the distance between the trap and the surface on which it seats when expanded. When the two hose are pulled to a horizontal position by the separation of the train, the lug *N* on one coupler comes opposite to a slot on the inclined plane *A* of the other coupler, and the two hose are consequently pulled apart without injury. This is clearly shown in the illustrations.

WILLIAMS.

This coupler differs from all others, inasmuch as it couples two distinct lines of pipe of different diameters in one coupler. One hose is beneath the other and both are united in the coupler in the manner shown. The larger pipe is for the



THE SAFETY HEATING & LIGHTING CO. COUPLER.

In use on CINCINNATI, INDIANAPOLIS, ST. LOUIS & CHICAGO, and many other lines.

passage of steam from the engine and the smaller opening is for the return to the engine. A small hole allows any condensed water in the upper pipe to pass into the lower pipe, where it is exhausted by a vacuum pump or analogous device on the engine. It is however believed that the lower pressure in the small pipe will permit the condensed water to re-evaporate, and consequently it is not anticipated that much trouble will result from water. The coupling is effected by slightly twisting and pulling the couplers to one side, when the two inclined planes or lugs engage with one another. They are forced closely together by means of handles actuating cams.

M'GEE.

This coupling has, like the Martin, a metallic flexible pipe. It has, however, no sliding joint, all the joints rotating. The packing in the joints is vulcanized asbestos, made by the Johns Pratt Co., Hartford, Conn. These joints give a universal motion and permit a very considerable variation in the distance apart of the cars. The ring on which the coupling joint is made is composed of layers of vulcanized asbestos cloth, wrapped round and round a mandrel, so that only the selvages can be attacked by the steam, and the rest of the ring is protected by a metal lining inside. The iron pipe forming the main body of the coupler is covered with asbestos cloth covered with canvas, so as to render it easy to handle when hot. The couplings are held in place solely by friction, the small cross bars shown pressing the couplings together. The couplings will separate without injury when the train parts. This coupling is used on the New York, New Haven & Hartford, in connection with the Henney system of heating.

In the illustration, *A* is the point at which the coupling is screwed to the main pipe under the cars; *B* is the junction

between the two couplers; *C* and *D* are joints allowing flexibility, and *E E* are short levers for forcing the coupling faces forcibly together.

PENNYCUICK.

This coupler differs from any of the others in being automatic. It has been classified as belonging to Class B, couplers that are not similar at both ends of the car. To a certain extent this might seem incorrect. Though each end of the car has similar trumpet shaped orifices, the male piece by which connection is made between the two trumpet orifices, must be only on one car of the two that are brought together to be coupled, just as in coupling with link and pin couplers only one coupler must be provided with a link.

It is constructed on the principle of the sliding ball and socket joint formerly used between engine and tender before the introduction of hose. The trumpet-shaped mouth, which receives the globular end of the coupling pin *A*, is segmental, and the segments are closed by springs as shown. The packing inserted in the fixed portion of the coupler makes a tight joint with the ball on the coupling pin *A*.

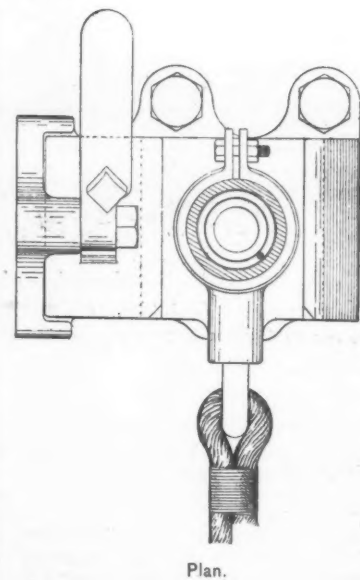
The sliding joint is also packed as shown, the packing being tightened by a spiral spring *D*.

When the coupling pin *A* is withdrawn in uncoupling a car, the segments *B* close, and the valve *C* is seated by a spiral spring as shown.

The rubber washer *F* prevents the entrance of dust and ashes when the car is running.

EMERSON.

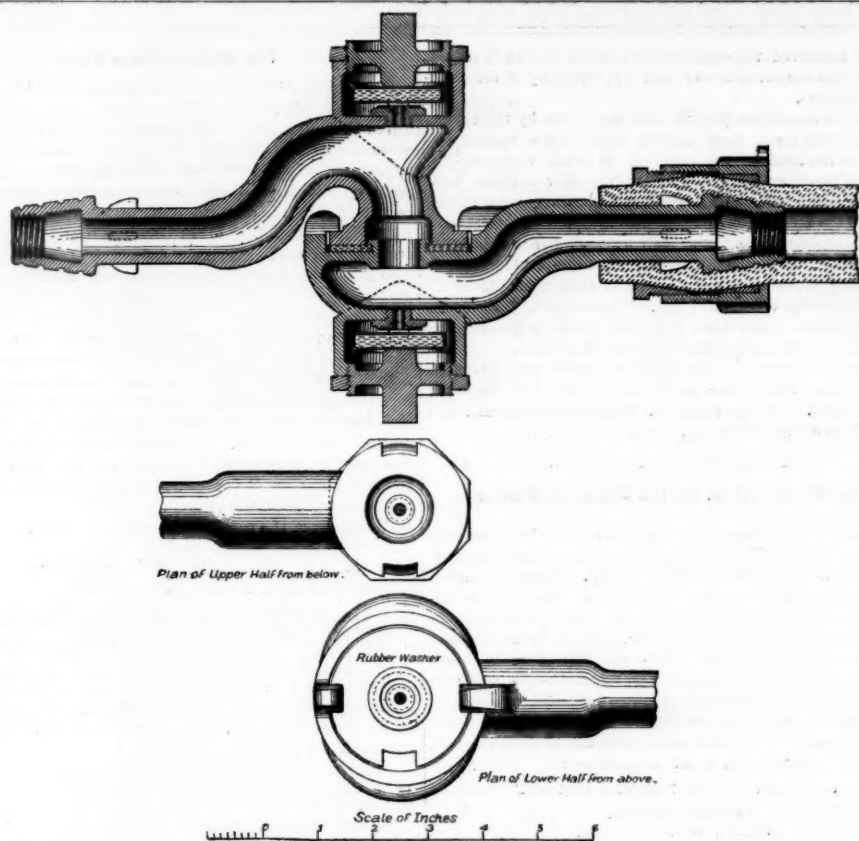
This coupler differs from any of the others by making a metal to metal connection. The part attached to the hose is of brass and slightly tapered and fits on a similar male cone, which is screwed to the iron train pipe. The two cones are forced together by a lever, which grips a collar on the back



Plan.

of the female cone. The coupler will pull apart without injury when the train parts, the lever being tripped by a cord or wire attached to the other car. This cord or wire is slipped into a notch in the lever and retained in place by a spring.

In the illustration *A* represents the junction with the main pipe, *B* the point of junction between the two couplers; the hose is placed on the nozzle *C*, and the cord for pulling the



THE GOLD COUPLER NO. 1.
In use on MANHATTAN ELEVATED.

handle to release the couplers when the train parts is attached at D.

SAFETY.

This coupler, as shown in our illustrations, is connected with a hose, but is also used with a flexible metallic substitute for a hose. The two surfaces making the joint are forced together by a cam, actuated by a lever, which can be operated by the foot. The set screw shown tapped into this lever serves to limit the throw of the lever when it is disengaged. As will be seen in the illustration, self-closing valves are provided, preventing any escape of steam when the couplings are separated. When the train parts the couplings separate by means of the wire cords shown in our illustrations. This coupler being above the platforms is very accessible and not so liable to interfere with the brake hose as couplers placed beneath the platform.

BOSTON, REVERE BEACH & LYNN.

This coupling is remarkably simple, and merely requires to be forced together to effect a coupling, and pulls apart with equal facility. It consists merely of a male and a female cone with a slight taper and held together by two pieces of spring steel. A joint is effected by means of a rubber ring sunk in a recess in the coupler.

GOLD NO. 1.

Coupling is effected by two lugs on one coupler entering two recesses on the other. On one coupler being rotated on the other, the lugs pass behind a flange, which is inclined spirally, so as to form a portion of the screw thread, thus tightening the two couplers together. A vulcabeston washer is placed upon one coupler and makes a joint with a brass face on the other. The thermostatic trap used is similar to that employed in the Gold coupler No. 2.

HITCHCOCK.

This coupler is also on the hit and miss plan, two lugs on the male coupler entering two corresponding slots on the female coupler, and the male coupler being rotated by twisting the hose, the lugs engage on spiral inclined planes in the female coupler. The male coupler is provided with a handle, cast solid with it, and is attached to a hose. The female coupler is screwed to the train pipe.

CLASSIFICATION.

The various couplers may be primarily classified into two types:

A. couplers in which the uniting parts are precisely similar. B. couplers where the uniting parts are dissimilar.

The Westinghouse brake hose coupling is an example of type A, and the old Smith vacuum hose coupling, or any other male and female coupling, belongs to type B.

The following couplers illustrated belong to the type A:

Gold No. 2. Martin. McGee. Williams. Sewall.

The following couplers belong to type B:

Boston, Revere Beach & Lynn. Hitchcock. Emerson. Pennycuik. Gold No. 1. Safety.

These types may be subdivided into different classes according to the manner in which the act of coupling is effected.

a. Automatic couplers, which couple without manipulation when the cars are run together.

b. Coupling effected without the use of levers or handles by butting the surfaces which make the joint, so that these surfaces do not rub on one another.

c. The joint surfaces are butted together by cams, eccentrics or inclined lugs operated by one or more handles or levers.

d. Male and female couplers.

e. Coupling effected by bending the hose or flexible pipe in a vertical plane, the surfaces making the steam tight joint rubbing against one another in the act of coupling and being held together by projections or lugs, no levers or handles being used.

f. Coupling effected by twisting the hose or flexible pipe.

g. Coupling requiring the use of levers or handles on each coupler.

The various couplers may be classified in the manner in which they are coupled, as follows:

a. Automatic: Pennycuik.

b. Butting surfaces: Sewall.

c. Butting surfaces, with handle: Emerson. Martin. Safety.

In the Emerson and Safety couplers, one handle is used, while two are used in the Martin, which may therefore be also classed under class g.

d. Male and female.

Boston, Revere Beach & Lynn.

e. Couple in vertical plane, with joint surfaces rubbing against one another:

Gold No. 1. Gold No. 2.

f. The hose twisted and the jointing surfaces rotated on one another in coupling:

Hitchcock.

g. Coupling effected by two levers, surfaces rubbed together:

McGee. Williams.

Two levers are also used in the Martin system, but as the surfaces are butted and not rubbed together, it has been placed in class c.

The hose in the Williams system is slightly twisted in coupling, but as it has two handles, it belongs more properly to class g.

The eleven couplers illustrated may therefore be classified as follows:

Type A. The uniting parts are similar:

Class b. Sewall:

Coupling effected without the use of levers or handles by butting the surfaces that make the joint, so that the surfaces do not rub against one another. The surfaces of the joint are kept together by the weight of the coupler and are uncoupled by lifting the coupler. They pull apart when the hose is straightened by the train parting.

c. Martin:

The surfaces making the joint are butted together by means of hinged handles on each coupler, the surfaces being kept in contact by means of springs.

Class e. Gold No. 2:

Coupling effected by bending the hose in a vertical plane, the surfaces making the joint rubbing against one another in coupling and being forced together by an arm on one coupler bearing against a spiral inclined plane or screw thread on the other. The couplers are uncoupled by lifting the hose, and pull apart when the hose is stretched to a horizontal line by the train parting. Each coupling is provided with a thermostatic trap letting off condensed water.

Class g. McGee:

The two surfaces making the joint are pressed together by means of hinged cross bars or levers. This coupling is held by the friction between the surfaces and can be uncoupled by pulling the hose apart.

Class g. Williams:

The hose are slightly twisted in making a coupling, and the joint making surfaces are forced together by eccentric cams actuated by handles on each coupler. Uncoupling is effected by reversing the process above described. The coupling pulls apart when the train separates. This coupler differs from the others illustrated in joining two distinct lines of pipe in one coupler.

Type B. Couplers in which the uniting parts are dissimilar.

Class a. Pennycuik:

The coupling is effected automatically, provided the male piece is in the proper position to couple.

Class c. Emerson:

The two coned surfaces are forced together by a lever.

Safety:

The surfaces are butted together by a cam lever worked by the foot.

Class d. Boston, Revere Beach & Lynn:

The joint is made by a slightly tapered male and female joint, a rubber ring being inserted to make a tight joint.

Class e. Gold No. 1:

Two flat surfaces are forced together by means of lugs rotating on spiral inclined planes, rotation being effected by bending the hose.

Class f. Hitchcock:

Two flat surfaces are forced together by lugs rotating on spiral inclined planes, rotation being effected by twisting one coupler by means of a handle.

COUPLERS FOR CONTINUOUS STEAM HEATING.

	Sewall.	Martin.	Gold No. 2.	Williams.	McGee.	Pennycuik.	Emerson.	Safety.	Boston, Revere Beach & Lynn.	Gold No. 1.	Hitchcock.
Coupling each end of car similar	Yes	Yes	Yes	Yes	Yes	No	No	No	No	No	No
Couple automatically	No	No	No	No	No	Yes	No	No	No	No	No
Pull apart without injury when cords are used	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No
" " " " without cords	Yes	No	Yes	Yes	Yes	Yes	No	No	Yes	No	No
Self-closing valve when uncoupled	No	No	No	No	No	Yes	No	Yes	No	No	No
Trap to let out condensed water	No	No	Yes	No	No	No	No	No*	No	Yes	No
Pipes so laid that water drains away from coupling	No	No	No	No*	No	No	No	Yes	No	No	No
Weight couplings, hose and nozzle for one car	Lb. Oz. 36 0	Lb. Oz. 37 0	Lb. Oz. 13 8	Lb. Oz. 19 0†	Lb. Oz. 26 0	Lb. Oz.	Lb. Oz.	Lb. Oz.	Lb. Oz.	Lb. Oz.	Lb. Oz.
Weight couplings, hose and nozzle for one car without hose for one car	Inches. 1 1/4	Inches. 1 1/4	Inches. 3/4	Inches. 2 1/2	Inches. 1 1/4	Inches. 1	Inches. 1	Inches. 1 1/4	Inches. 1 1/4	Inches. 1 1/4	Inches. 1 1/4
Minimum bore, diameter	1 1/4	1 1/4	3/4	2 1/2	1 1/4	1	1	1 1/4	1 1/4	1 1/4	1 1/4
Straight passage	Yes	Yes	No	Yes‡	No	Yes	Yes	Yes	Yes	No	Yes
Jointing surfaces	Vulcabeston on vulcabeston	Vulcabeston on vulcabeston	Vulcabeston on vulcabeston	Rubber on rubber	Vulcanized asbestos on ditto	Brass on rubber.	Brass on brass	Mail. iron on rubber	Brass on rubber	Brass on vulcabeston	Brass on vulcabeston
Rubber hose used	Yes	No	Yes	Yes**	No	No	Yes	Yes	Yes	Yes	Yes

* Traps would appear to be unnecessary with these systems, as in the Safety the water drains away from the coupling, while in the Williams the return pipe to the engine is intended to re-evaporate all condensed water.

† Passage is slightly obstructed by wings of safe closing valve.

‡ This weight does not include four hose nozzles.

§ Diameter of passage from engine, the return passage is 1 in. diameter and is somewhat bent, while the other passage is straight.

** Four hose used per car.

Wires over Railroad Tracks.

The object of this article is to induce railroad companies, whose tracks are crossed by a network of wires, endangering the lives of employees and disfiguring what might otherwise often be a charming view, to take steps towards placing them in better order, using, as an illustration of how it may be done, the experience of one company with this problem.

A multitude of wires, of all kinds and sizes, strung over a railroad track at every accessible height, lengthwise, crosswise and almost perpendicularwise, is not valuable as a means of cultivation of the artistic sense in a community. Neither does their presence increase the safety of freight brakemen, as more than one accident, and many narrow escapes from accidents, afford convincing proof.

Partly on account of the appearance, partly to improve the working of electric signals, but principally on account of the danger of such crossings, the Boston & Albany has had removed within the last few years most of the straggling wires which formerly crossed its tracks, and those which must cross grouped together as much as possible and securely fastened to strong fixtures at a greater height over the tracks than is ordinarily the case, or put under ground.

These wires were of six different kinds: (1) Those belonging to the railroad company. (2) Western Union telegraph for railroad use. (3) Those belonging to other telegraph or such like companies, which had been given by cities or towns or by the United States Government rights of way along certain streets or highways crossing the railroad. (4) Fire alarm wires, or telephone or telegraph wires occasionally used for fire alarm purposes. (5) Telephone, district telegraph, time service and private wires of all kinds; and (6), most dangerous of all, "dead" wires, which had been formerly used for some purpose but afterwards abandoned. There were quite a large number of these, and most were in a very unsafe condition.

Each of these classes was separately dealt with, and in some cases each wire was made the subject of special consideration. The work was begun in 1880 by putting the railroad company's wires underground where they cross the tracks. Hardly a deviation from this rule has been made, except for its electric light wires, which have not yet been buried. Since that time, in all new construction, or extensive repairs, wires which cross the tracks have been put underground from the start, wherever that was possible. In regard to the others, the first thing done was to make a plan or rough sketch of the tracks in places where there were many wires; the next step was to send for the chief line-repairers of all the electric light, telegraph, telephone, time service and other companies, owning or using line wires, to meet the electrician of the railroad company at a convenient point on a certain day. The whole party then walked along the tracks, and each lineman pointed out the wires under his charge. Each of these was plotted on the plan, and marked with a serial number, and also the name of the owner, if it could be ascertained. Notices were then sent to the proper parties briefly stating the reasons for the request, and asking them to do one of the following things, according to the purpose for which the wires were used:

- (1) Remove them altogether within a reasonable time.
- (2) Bring them together at as few points as possible, and cross under the tracks, or if [that could not conveniently be done,
- (3) Take such precautions as would make the overhead crossing perfectly safe.
- (4) Remove them to other designated locations where a crossing would be less objectionable (in a shorter span or for other reasons).

At first these notices were quite generally disregarded by those to whom they were sent. Many of these lines had been built by irresponsible parties upon contract, the owner merely paying the constructor so much money for a line between such and such points, without knowing or caring where it went; people of this sort were naturally disinclined to bear the expense of necessary changing, and were disposed to try and throw it upon the contractor. Some of the notices also doubtless failed by reason of the addressee's residence not being correctly learned. Abundant opportunity was given to all who wished to do so to provide new locations for their wires. At the end of the prescribed time a force of linemen was sent out and began removing those wires which had remained, many of which belonged to unknown parties.

Within a few hours, linemen of all complexions began to appear at the places where this work was going on, having followed their wires to this point to find the cause of their interruption. Many of these immediately reported what was being done to their respective employers, who took steps to find other locations for their wires. In a few cases the wires were replaced in their old positions. They were again removed and the repairmen watched for, and when seen the matter was explained and he was instructed not to replace the wires without permission. Telephone and telegraph companies were usually disposed to cheerfully comply with the wishes of the railroad company, and at once take steps to make the crossings of their wires safer, and every reasonable facility was given them for so doing.

Attention to this work continued through the summer, and by the end of the season only a few objectionable wires remained. These were for the most part taken in hand early the next season, and there has been very little trouble since.

Another phase of the general plan was the removal of all superfluous telegraph poles (of which there were sometimes two needless lines on one side of the tracks) and the carrying of all the wires running along the road on one line of poles on each side set at a uniform distance from the tracks, usually at the outside of the right of way. In some places this ma-

terially improved the engineman's view of the track ahead, and always improved the appearance, especially in the vicinity of stations.

All these operations (except what was done by the owner, of trespassing lines) were usually done by the regular employees of the road in the intervals of other work, and the cost was therefore very small. In the new stations built since these improvements were begun, entrances for all the wires in the building have been provided at some convenient and inconspicuous point, and their presence does not disfigure the building. From Boston to Albany there are now fewer straggling wires crossing the tracks than there formerly were in the city of Boston alone. The owner or person who controls nearly every wire over the tracks is known and when repairs are needed can be promptly notified.

A small expense, a comprehensive policy and judicious action would soon place many other roads afflicted with the overhead crossing nuisance, in as comfortable and safe a condition as the Boston & Albany now enjoys.

The Block System on the Canadian Pacific.

The passenger trains on this road are protected from rear collisions by a system of telegraphing which is really equivalent to the block system, as far as it goes, though the modifications permitted in practice constitute an element of weakness, which renders it necessary to make allowances in judging of the value of the system, and to be careful and not charge the block system *per se* with any of the elements of danger that may be seen in the method under consideration. The plan is simply to hold trains following a passenger train until the latter has reached the next station; and the method of using it will be seen by reference to the form used by the station operators, which is as follows:

CANADIAN PACIFIC RAILWAY COMPANY.

EASTERN DIVISION.

Station Clearance Order.

Time.....M. Date.....1887.....Station.
CROSSING ORDER for Conductor.....Train No.
The RED SIGNAL displayed at this Station is for Train
No.going.....and does not affect your Train.
.....Train ahead, left this Station at.....M.,
and left.....which is next Telegraph Station,
at.....Signal carried to this Station by No.
Signature of Agent and
Telegraph Operator.

Advise your Engineers to keep sharp lookout ahead.
CONDUCTORS AND BRAKEMEN, PROTECT YOUR TRAINS FROM
THE REAR.
Carefully read and observe instructions on the back of this form.

The back of the order has the following:

This clearance order will be issued to trains following first-class trains on receipt of telegraph report of departure of first-class train from next telegraph station ahead.
Second-class trains will be protected in the same way.
All of the Pennsylvania road; I. A. Swigard, General Superintendent; L. B. Paxson, Assistant Superintendent Motive Power; M. F. Bonzans, Division Superintendent; C. G. Hancock, General Passenger Agent, and G. W. Cushing, Superintendent of Motive Power, Philadelphia & Reading; J. V. Smith, General Baggage Agent, and W. A. Pratt, Roadmaster, Philadelphia Division of the Baltimore & Ohio; Charles Hartshorn, Vice-President Lehigh Valley; A. G. McCausland, General Superintendent, and F. L. Hills, Chief Engineer, Wilmington & Northern; Gen. John M. Hood, President Western Maryland; W. L. Austin, Baldwin Locomotive Works; Job Jackson, Wilmington Car Works; Edwin S. Cramp, William Cramp & Sons; W. P. Tatham, ex-President of the Franklin Institute; Sergeant Townsend, Signal Service; H. G. Morris, Wm. Sellers, Cyrus Chambers, Jr., W. Barnett Levan, Joe Cook, M. Richards Mucklé, Eugene Borda, Prof. Edwin J. Houston, Prof. Z. Hopper, Prof. Fettes and Dr. A. L. Kennedy.

In cases where report of first or second-class train ahead cannot be obtained through telegraph line being in trouble, trains will follow twenty minutes apart. Agent will give clearance order, noting on same in space for train ahead "wire in trouble." Conductor will, under these circumstances, hand clearance order to engineer, who must keep his train under full control, so as to stop on short notice, if signaled. No excuse will be accepted for striking rear of train ahead.

It will be seen that the same form answers for various uses by erasing a portion of the printed matter. Although the printed rules provide for the protection of freight trains by this system we understand that it is not done; doubtless the frequency of these trains renders blocking impracticable without additional telegraph stations.

This system is used on the busiest sections of the Canadian Pacific, where trains average as high as forty per day, and where a rush of traffic sometimes necessitates fifty or sixty; but the officers say that it gives no trouble and has been in use for three or four years with perfect satisfaction. Each operator reports each passenger train as soon as it leaves, without stopping to call up the dispatcher or any one else (though this rule is modified on those portions of the road where traffic is so thin that dispatchers do not constantly watch the wire); the operator at the station in the rear, whose signal is at danger for the protection of this train, is on the watch for the report and pulls down his semaphore as soon as he hears it. The form of the report is

"Ux Ux up pass. No. ... on time Sy." The opening letters (Ux repeated), meaning "up train" and the closing "Sy" signifying the name of the station. Of course, if the operator who is waiting to pull down his signal fails to hear this report he has to ask for it, and in case a following train desires to start after a reasonable time has elapsed and the permission is not forthcoming inquiry has to be made, with a view to sending trains under permissive block regulations if authority to give clearance is not received within 20 minutes. Where trains do not regularly stop they are allowed to proceed by giving them the semaphore "all clear" signal, though if the preceding train has not passed out of the block they are stopped and instructed in writing. Each station has a distant fixed signal, which is kept at caution except when lowered to let in a train. The train sheets kept by the station operators and the clearance orders received by conductors are gathered by the division superintendents daily and carefully compared. The distances between stations on the Canadian Pacific are such that in nearly every case the passenger trains can run from one to another in about ten minutes, or less, so that with operators closely attentive to duty very little time need be wasted.

The Westinghouse Train.

Some further trials of the Westinghouse freight brake took place on the 26th ult. near Philadelphia. The track used was part of the main line of the Pennsylvania, at Wynnewood station, near Bryn Mawr. The gradient was 44 ft. to the mile, and the trains rounded a curve just before reaching the stopping post, beyond which small posts were erected at intervals of 50 ft., in order to observe the distance traversed by the train after brakes were applied until the cars were brought to a stop. The train consisted of 50 freight cars, coupled closely together, each measuring 38 ft 4 in. long and weighing over 30,000 lbs.; the total length of the train was consequently about 1,900 ft., and its total weight, exclusive of the engine, was over 1,500,000 lbs. The cars were hauled by a single locomotive, with two "assistants" at the rear. The two rear engines slackened speed and stopped before reaching the post, allowing the train to be managed by the single engine. The brake was applied as the engine reached the signal post. The time necessary to stop the train was noted by stop-watches, the speed of the train recorded on indicators on the engine, and the distance traversed was measured from the posts.

The results of the various tests were as follow:

No.	Kind of test.	Speed. Miles per hour.	Distance. Ft.	Time. Seconds.
1.	Emergency stop.....	23	264	14½
2.	36	553½	19½
3.	Brakes applied in 2 seconds while train was standing.	36	579	18¾
4.	Emergency stop.....	36	579	19
5.	Service stop, brakes released and train restarted in 3 seconds.	36	1883	72
6.	Hand brake.....	18	1883	72
7.	Breakaway. The two portions of the train when stopped were 35 ft. apart. The train was broken apart at the 35th car.			

The next tests were made with trains of 20 freight cars with increased leverage, as in passenger service. The results were as follow:

No.	Kind of test.	Speed. Miles per hour.	Distance. Ft.	Time. Seconds.
8.	Emergency stop.....	20½	57	6

The following test was made with the above train and a train of passenger cars run side by side, the brake being applied simultaneously to both trains when the engines were abreast and running at the same speed:

No.	Kind of test.	Speed. Miles per hour.	Distance. Ft.	Time. Seconds.
10.	Freight.....	40½	648	19
	Passenger.....	40½	832	23

The air pressures carried were 82 lbs. on the freight and 86 lbs. on the passenger train.

The tests were witnessed by about 700 spectators. Among those present were Messrs. George B. Roberts, President; Frank Thomson, Vice-President; W. J. Latta, General Agent Charles E. Fugh, General Manager; S. M. Provost, Superintendent of Transportation; and W. H. Brown, Chief Engineer; R. E. Pettit, General Superintendent; H. F. Kenney, Superintendent (P. W. & B.); W. N. Bannard, Division Superintendent; Frank Sheppard, Superintendent Motive Power; Rufus Hill and W. McAllister, Master Mechanics, all of the Pennsylvania road; I. A. Swigard, General Superintendent; L. B. Paxson, Assistant Superintendent Motive Power; M. F. Bonzans, Division Superintendent; C. G. Hancock, General Passenger Agent, and G. W. Cushing, Superintendent of Motive Power, Philadelphia & Reading; J. V. Smith, General Baggage Agent, and W. A. Pratt, Roadmaster, Philadelphia Division of the Baltimore & Ohio; Charles Hartshorn, Vice-President Lehigh Valley; A. G. McCausland, General Superintendent, and F. L. Hills, Chief Engineer, Wilmington & Northern; Gen. John M. Hood, President Western Maryland; W. L. Austin, Baldwin Locomotive Works; Job Jackson, Wilmington Car Works; Edwin S. Cramp, William Cramp & Sons; W. P. Tatham, ex-President of the Franklin Institute; Sergeant Townsend, Signal Service; H. G. Morris, Wm. Sellers, Cyrus Chambers, Jr., W. Barnett Levan, Joe Cook, M. Richards Mucklé, Eugene Borda, Prof. Edwin J. Houston, Prof. Z. Hopper, Prof. Fettes and Dr. A. L. Kennedy.

The experimental train will be taken next to Washington, where a similar series of tests will be shown.

Massachusetts Charitable Mechanics' Association.

The 16th triennial exhibition of this association is now being held in Boston. Several exhibits specially interesting to railroad men are shown. The Dunham Mfg. Co., of Boston, exhibits a handsome model of the Dunham freight car door. The Park Mfg. Co., of Boston, has an attractive display of injectors and inspirators which are shown in operation.

The Hancock Inspirator Co. has an exhibit of its already well-known manufactures, and the W. T. M. Injector Co., of Boston, is also represented.

Robert L. Walker, Boston, inventor of the Walker Smokeless Locomotive, shows his patent grate for stationary boilers, by the use of which he claims a large saving of coal can be effected.

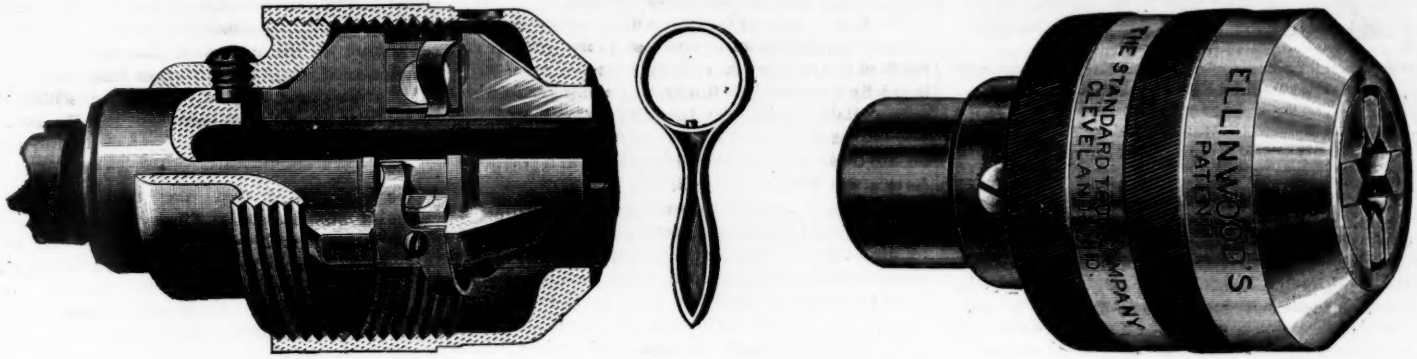
E. P. Bullard, Bridgeport Machine Tool Works, has a good collection of machinery for use in railroad shops—among which is a new patent screw cutter, which has been sold to the Boston & Albany.

Charles L. Ireson, of Boston, has a very interesting exhibit, showing the process of manufacturing the patent link leather belting.

Charles A. Schieren & Co., of New York, also display their link leather belting.

The Union Indurated Fibre Co., of New York, show the various articles which they manufacture from wood fibre. This exhibit is a pleasing one, and the demand for the goods seems to be brisk among the visitors.

The Mitas Wrought Iron Casting Co., of Boston, show



ELLINGWOOD'S PATENT DRILL CHUCK.

Made by the STANDARD TOOL CO., Cleveland, Ohio.

a variety of castings made from melted wrought iron, which they claim are as durable as steel.

John A. White, of Concord, N. H., and the S. A. Woods Machine Co., of Boston, have good displays of their wood-working machinery.

The Mason Regulator Co. show pressure regulators and reducing valves.

The Seibert Cylinder Oil Cup Co. show their specialty, and Tyler Bros., of Boston, exhibit boiler tubes.

The ubiquitous car coupler is also here. The Boston automatic coupler is shown on two miniature freight cars running on a track, and Mr. Upham, the Secretary, and Mr. Kendall, General Agent of the company, are kept busy explaining the mysteries of coupling cars to interested groups of visitors. In connection with this exhibit is shown the Hanson automatic car brake.

Other draw bars are displayed by George M. Guild, of Boston, and Isaiah Tillson, of East Whitman, Mass.

The Nicaragua Canal.

A party of 40 hydrographers, transitmen, levelers, etc., under the charge of E. R. Peary, Civil Engineer, U. S. N., started for Greytown and the mouth of the San Juan River on the steamer Honda, Wednesday last, to make detailed surveys and a location for the Nicaragua Canal, on which a definite estimate of the cost can be made. The Honda was accompanied down the bay by the Sam Sloan, which carried a large party of engineers, capitalists and friends of the enterprise.

A circular was distributed on the Sloan, setting forth that the collapse of M. de Lessep's scheme opens the way for American capital and enterprise to secure the control of this great pathway of commerce in American business.

A new concession has been negotiated with Mr. Menocal, the Chief Engineer, by the Nicaraguan executive, and an organization effected, including Frederick Billings, of the Northern Pacific; Hon C. P. Daly, Francis A. Stout, President; Horace L. Hotchkiss, Treasurer; C. A. Cheney, Hiram Hitchcock, Chas. H. Stebbins, Y. F. O'Shaughnessy, ex-Gov. Horace Fairbanks, the Garretts of Baltimore, ex-Gov. A. B. Cornell, Admiral D. Ammen, who has constantly advocated this route, and many others.

Our readers will remember that Mr. Menocal's last plan is to build a dam in the San Juan River, which will raise the level of the water in the upper portion of the river to that of Lake Nicaragua, 110 ft., the canal leaving the river at the dam and crossing the country to near Greytown. Its estimated length is 169.8 miles; cost \$64,000,000.

News comes that M. de Lessep's has at length concluded to build locks on his canal. If he had adopted this plan when he found what a treacherous material he had in the Culebra cut, &c., when he made his first borings, which should have been before any plan was adopted or any money expended on construction, it is probable that he would have been able to complete the Panama Canal. Now it is too late, for France can hardly respond to calls for much more capital for the enterprise until she has had time to reacumulate the capital already lost, and to forget some of her latest lessons.

Ship Building on the Lakes.

We print herewith a table showing the shipping built on the lakes, at and above Buffalo, this year. It amounts to, neglecting smaller craft, five steel and one composite steamer with an aggregate net tonnage of 11,372 tons, valued at \$1,150,000; 43 wooden steamers aggregating 47,737 tons, valued at \$4,367,000 and four wooden sail vessels of 4,633 tons, valued at \$300,000; or 53 vessels in all valued at \$5,817,000. It will be noticed that the average value of the five steel steamers is \$101.50 per ton, while the wooden steamers are valued at only \$10 per ton less.

The average tonnage launched per operative employed in the ship building trade in England, according to Mr. J. S. Jeans, the Secretary of the British Iron Trade Association, is 14 tons; on this assumption and taking the net tonnage at 0.7 of the gross tonnage, over 6,500 men have been employed in the lake ship yards. By the same authority 0.6 of a ton of iron or steel goes, on an average, into every ton of iron vessel. This would give 8,400 tons for the five steel steamers built this year, or enough to lay about 90 miles of track.

The tonnage built in the same locality for the fiscal years

1884, 5 and 6, as returned by the United States Commissioner of Navigation was:

	1886.	1885.	1884.
Sail tons.....	4,896	3,669	7,230
Number.....	11	24	25
Steam tons.....	10,779	15,501	15,835
Number.....	14	24	25
Total tonnage.....	15,675	19,170	23,065

The increase to 63,732 tons shown in the table records a remarkable development in the appliances of transportation, which would be greater if all the craft constructed had been returned in the table. At the end of the fiscal year ending June 30, 1886, the steamers on the lakes were 1,174 in number, with a tonnage of 372,961, of which 38 steamers of 40,460 tons were of iron or steel, and 1,105 sailing vessels registering 262,657 tons, or 635,618 tons in all.

This activity does not seem to be subsiding, as according to the Buffalo Commercial Advertiser \$2,500,000 of the money of that city is to be expended mostly for steamers of 2,000 to 2,200 tons. Seven of these are to be steel steamers.

The improvement in the prospects of lake freighters is greatly due to the increased demand for the Lake Superior iron ores and the consequent development of that country and the shipping ports, a development in which various railroads are hastening to share, and it is probable that a great deal of ore will be shipped East this coming winter by the roads which connect with the mines on the south side of Lake Superior. The Sault Ste. Marie Canal must, however, continue to take the largest, though a continually decreasing, proportion of the trade of the Lake Superior country.

The increase of the traffic through the canal for the season has been very great. We are indebted to General O. M. Poe, U. S. Engineer, for an estimate of the traffic for this year, which we place with the returns of traffic through the St. Mary's and Suez canals for the preceding five years:

	St. Mary's Falls Canal.		Suez Canal.	
	No. of vessels.	Tonnage.	No. of vessels.	Tonnage.
1882.....	4,774	2,468,088	3,198	5,074,809
1883.....	4,315	2,042,259	3,307	5,775,662
1884.....	5,698	2,997,894	3,284	5,771,501
1885.....	5,380	3,035,937	3,624	6,335,752
1886.....	7,424	4,219,397	3,100	5,767,656
1887.....	5,600,000

As the above estimate was forwarded on the 28th ult., it is probably not far from correct, and it is likely that the traffic through the magnificent lock at the foot of Lake Superior will be as large for seven months of this year as that through the Suez Canal for the whole year.

At a convention held at Sault Ste. Marie last summer in favor of a new and larger lock which the rapidly increasing traffic of the upper lakes will soon imperatively demand (the plans for which were described in the Railroad Gazette of March 4 of this year), it was asserted that if the same rate of toll had been charged on the tonnage passing through St.

Mary's Falls Canal as was charged on the Suez Canal, viz., \$2.05, the receipts would have amounted to over \$8,600,000, and if the same tolls had been charged on this season's business the receipts would have been over 15½ million. It was resolved that the estimated cost of the new lock, \$4,738,865, and for the improvement of the Hay Lake Channel to fit it for vessels of 20 ft. draft, \$2,659,115, or \$7,397,980 in all, should, "in consequence of the pressing necessity for largely increased facilities to meet the increasing demands of commerce," be taken out of the usual course of appropriations and a sufficient amount of money to pay for its cost be appropriated at once and held subject to draft of the Secretary of War for that purpose.

This recommendation cannot be too highly commended, it would stop a great deal of the trading inaugurated in 1807, and would lead to that careful consideration of a projected improvement which a proposed appropriation of \$5,000 or \$10,000 cannot command, though an appropriation for a harbor or river, whatever its amount, seems to irrevocably commit the government to complete the improvement. In the meantime its cost, which may be stated to equal

$$\frac{a(1+r)^n - a}{r}$$

in which a = the annual payments, supposing them to be regular and uniform, r = the rate of interest per cent., and n = the number of years through which the payments extend, is liable to be enormously extended by the failure of appropriations through one or more years, during which plant decays and labor is scattered.

The general adoption by Congress of the recommendation of this Waterways Convention would save the country a respectable percentage of the money now expended for all of the improvements undertaken by government, and at the same time destroy many of the arguments of those opposed to appropriations for such purposes.

Ellinwood's Drill Chuck.

The accompanying engravings represent a new drill chuck recently introduced by the Standard Tool Co., of Cleveland, Ohio. It will be seen from the sectional view that it is adapted to hold either straight, taper or square shank drills or tools with equal rigidity, and in such a manner that they will run perfectly true. The jaws are of best tool steel, carefully hardened, and it appears to be well made throughout. All parts are interchangeable. A hole runs entirely through the chuck, so that it can be threaded to fit lathe spindles.

Two sizes of chuck are made, No. 1 size holding taper shank drills up to 1½ in. diameter, and straight shank drills up to 1¼ in. diameter. Size No. 2 will hold straight shank up to 1½ in., and taper shanks to 1¼ in. diameter.

NUMBER OF STEAM AND SAIL CRAFT BUILT ON LAKE ERIE AND UPPER LAKES IN 1887.

Built at.	By whom.	Wood.		Steel steam.	Compo site steam.	Tonnage for.		Total net tonnage.	Value.	For what trade.	
		Steam.	Sail.			Individuals	R R & S't'lt Cos.				
Buffalo	Union D. Dock Co.....			1		2,500	2,500	\$250,000	Grain.		
"	Mills & Co.....	1				1,740	1,740	120,000	"		
Barara.....	T. Nestor.....		1			759	1,759	110,000	Lumber.		
Bay City.....	E. Wheeler.....	5				5,500	5,500	550,000	"		
"	Jas. Davidson.....	1				2,928	2,928	270,000	"		
Cleveland	L. P. & J. A. Smith.....	1				390	390	65,000	General.		
"	"	1				494	494	85,000	"		
"	Cleveland D. Dock Co.....	1				2,000	2,000	115,000	Ore, coal and grain.		
"	Globe Iron Works.....				4	4,558	2,800	73,356	Ore.		
"	Quayles Sons.....		1				1,078	1,078	75,000	"	
"	"	4				3,500	3,564	7,064	600,000	"	
"	M. Ratcliffe.....	4				2,700	2,000	5,500	465,000	Ore and grain.	
"	Presky & Co.....	1				1,585	1,585	115,000	"		
"	Wurphy & Co.....	1				1,800	1,800	150,000	"		
Detroit.....	Detroit D. Dock Co.....	5				5,432	5,432	500,000	"		
"	"		1			1,321	1,321	85,000	"		
"	"			1		1,516	1,516	150,000	"		
"	J. Oades.....	1				761	761	70,000	"		
Gibraltar.....	R. W. Linn.....	2				1,300	1,300	100,000	Lumber.		
Grand Haven.....	E. Kitby.....	2				750	750	70,000	Ore, grain and lumber		
"	Robertson.....	2				416	416	47,000	"		
Manitowoc.....	H. E. & G. B. Burger.....	2				600	600	65,000	Grain, lumber, coal.		
Marine City.....	W. B. Morley.....	1				1,259	1,259	100,000	Ore, coal, grain.		
Milwaukee.....	Wolf & Davidson.....	2				2,956	2,956	280,000	"		
"	M. S. T. Co.....	2				1,819	1,819	145,000	"		
Mt. Clemens.....	Wm. Dulac.....		1			467	467	30,000	"		
St. Clair.....	S. Langell.....	1				1,581	1,581	130,000	Ore, grain.		
Trenton.....	Craig & Son.....	3				3,002	3,002	335,000	"		
		43	4	5	1	36,646	27,096	63,732	\$5,817,000		



Published Every Friday,
At 73 Broadway, New York.

EDITORIAL ANNOUNCEMENTS.

Contributions.—Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and in their management, particulars as to the business of railroads, and suggestions as to its improvement. Discussions of subjects pertaining to ALL DEPARTMENTS of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.

Advertisements.—We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay, EXCEPT IN THE ADVERTISING COLUMNS. We give in our editorial columns OUR OWN opinions, and those only, and in our news columns present only such matter as we consider interesting and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially, either for money or in consideration of advertising patronage.

The trunk line presidents, at a meeting in New York last week, all the roads being represented except the Grand Trunk, voted unanimously to adopt the combined per diem and mileage basis for the payment of freight car service, and directed the committee (one from each road) to arrange for putting it in force. It is thus settled that the system is to have a trial on a scale large enough to show decisive results, and so far as the action of the larger lines can directly affect the question it is now in a promising state. What will be the attitude of the shorter lines and those which have a larger proportion of terminal business, or what degree of influence the larger roads will be able to exert over these remains to be seen. The presidents at the same meeting resolved to pay (after Dec. 1) only $\frac{1}{2}$ cent a mile for refrigerators, palace horse cars, etc., instead of 1 cent, which has been the common rate heretofore.

Secretary Lamar's recommendation that the Interstate Commission be made independent of the Interior Department is justified by the facts in the case. If the Commission were a mere administrative body it might properly remain where it is. The original expectation was that its duties would be largely of that kind. But this expectation has not proved correct. The Commission to-day is to all intents and purposes a Court. It does not find its main business in supervising rates or in suspending the operation of the Interstate Commerce act. It does very little of either. Its chief duty is to interpret the transportation law of the United States, and by this interpretation to provide for the development of new law where it is needed. Its opinions are not mere comments on the law; they are themselves becoming law with wonderful rapidity. This fact of itself removes the Commission from the sphere of the Interior Department, and makes it an integral part of our judicial system. It is desirable that this fact should be recognized.

Some further points on the management of freight claim departments will be found in a letter printed in another column. Lack of help can indeed paralyze any undertaking of the kind, but a short force of clerks simply transfers the blame from the claim agent to the board of directors or other custodian of the appropriations, provided the claim agent has had the courage to tell his superior how much help is justly required. Our correspondent's remarks about the way in which claim agents are judged by the greater or less aggregate of their payments is only too true. This office is eminently one which cannot be judged by figures, at least not in any general way, and directors cannot too soon learn that "judging them by their fruits" is an exceedingly delicate proceeding. Confidence in the agent's integrity, judgment and fairness is especially necessary and there is no other office where it pays better to secure these qualifications at the outset. While claim agents' associations are not a cure for the present evils, they can exert a decided influence in

the right direction if supported by earnest and thoughtful men.

The war in dressed beef rates does not cover a sufficiently large amount of business to involve the railroads of the country in serious financial trouble. It is chiefly important as illustrating a danger to which we are liable under the Inter-state Commerce law. The railroads do not want war on dressed beef rates or on anything else; but the shippers are in a position to force a war whether the railroads wish it or not. One large shipper refuses to send goods by the Grand Trunk unless he receives a lower rate by that line than by any other. The Grand Trunk cannot refuse to make the differential without losing its business; the other railroads cannot allow such a differential to be made without running the risk of losing their business. Division of traffic is prohibited by law. Nothing remains possible but a war of rates. This was the state of things which, in 1874 and 1875, led to the growth of the "Evener" system and to the development of the Standard Oil Company. It led to a series of contracts which hurt the public far more than any pooling system possibly could do, without giving the railroads any of the advantages which the pooling system possesses. It is true that such abuses as existed in 1875 are to-day prohibited by the Inter-state Commerce law. But where the shippers in a given line of trade are comparatively few in number and have it in their power to a certain extent to dictate terms to the railroads, the law becomes specially hard to enforce. There is danger, we cannot as yet say how great, that the prohibition of pools will have the effect of enabling those industries which are most nearly monopolized or most closely organized to dictate terms to the railroads and receive the lowest rates for their shipments. Where there are a large number of shippers no railroad is likely to lose all its business at once; there will be small losses at one point and small gains at another. But where the shippers can act as a unit they may threaten the railroad with the loss of its whole business of a certain kind, and force it to a line of action which is neither good railroad economy nor good public policy. In these days of gigantic corporate trusts, this is a serious danger. If the law prohibits railroad pools but cannot cope with rings of producers, it simply deprives the railroad men of the power of self-defense. Where the law is strong enough to control everybody it is right to prohibit carrying weapons; but it is simple madness to try to prohibit some people from carrying weapons when there are other people whom you cannot control who are ready to take advantage of their weakness.

We said two weeks ago that the decision in Boards of Trade Union of Dakota vs. Chicago, Milwaukee & St. Paul laid down a principle whose application it would be hard to restrict. We are already beginning to see examples of this difficulty. The case of E. B. Raymond against the same company, decided last week, involves a step further toward the assumption of the rate-making power on the part of the Commission. In the previous case the complainants lived at intermediate points on an alternative route from Minneapolis to Chicago, which the company might have used for through business but did not. In the present case the complainant lives on a branch line; what is more, a narrow gauge line at that. From Minneapolis and from intermediate points on the river division, the grain rate to Chicago after the passage of the Inter-state Commerce act was reduced to $7\frac{1}{2}$ cents. At about the same time rates from McCracken—a point on the narrow gauge line, distant 18 miles from the main line—were reduced to 8 cents a 100 lbs., while those from Mazeppa, the home of the complainant, 52 miles from the main line, were placed at $12\frac{1}{2}$ cents. It is now held that this is unjust discrimination against Mazeppa and that the company must reduce its rates from that point to Chicago to 10 cents. The company would have a somewhat stronger defense if the rates from McCracken had been placed at the higher figure. As it is, the Commissioners apply the broad principle that this difference in rates operates as a discrimination against Mazeppa; and they say that the railroad company, by its own action on the McCracken rates, shows that the necessity of transshipment from the narrow gauge to standard gauge does not constitute a sufficient difference of circumstances to warrant a five cents difference in charge. This is undoubtedly pleasant doctrine to the shippers at Mazeppa, who have a narrow-gauge branch already built. How it will affect the development of the towns which want such branches but have not yet got them remains to be seen. The case illustrates the manner in which reduction of rates at some points prevents an extension of facilities to others. The difference of gauge and consequent in-

creased expense of operation, is but one element in the relatively greater cost of operating a branch with light traffic, and fortunately it is a very exceptional one. On such branches the service will ordinarily cost more to the company, and be worth more to those served, than on the main line, and relatively higher rates must be paid. A ruling which reduces rates to an unprofitable point can hardly be for the public interest.

Having noticed that the neat appearance of some of the Boston & Albany stations was owing in a large degree to the absence of the snarl of telegraph wires that usually surround passenger stations, we requested Mr. Blodgett of that road, whose writings are not unfamiliar to our readers, to give us an account of their experience in dealing thus successfully with the wire nuisance; and his paper will be found in another column. Although attention to aesthetic points, the expenditure of money "just to improve the looks" of things, may be deemed sentimental and unpractical, comparison of a line like that of the Boston & Albany and of others that do likewise, with one which still tolerates the ugly poles, poorly fitted cross-arms and shabbily strung wires which are so common, generally convinces even the most matter-of-fact skeptics. As to safety, the lesson of the great cities ought to be instructive; they have tolerated the free and easy habits of the electric companies until neglected wires and dead poles have killed people, while the monster wire nuisance is now so great that it is still doubtful whether it can be entirely thrown off. The clearing of engineers' view is a point worthy of note, and the removal of poles as far as possible from the track is an additionally, though, perhaps, remote safeguard against obstruction of track in high winds. A noticeable point in Mr. Blodgett's writing is the minuteness with which he tells just how to do a thing. If one wishes to act on his advice there are no annoying ifs which he has forgotten to explain.

The sale of the Minnesota & Northwestern to the Chicago, St. Paul & Kansas City probably means no more than the consolidation in one organization of interests which are practically identical. The stock of the two companies is held mainly by the same owners. The proposition is to exchange the stock of the Minnesota & Northwestern for that of the Chicago, St. Paul & Kansas City, share for share. The charter and name of the former company, under which the road is built, date from 1854. It has a lease for 999 years of the Minnesota & Northwestern of Illinois, chartered in 1886, and now building from East Dubuque to Chicago. At present the trains of the company run over about 70 miles of the track of the Illinois Central, but it is expected that the track of the Minnesota & Northwestern will be completed in January. The proposed line to Lake Superior from St. Paul will probably not be built by the Minnesota & Northwestern as a corporation, but by investors whose interests are closely allied to that road. Surveys of the line have been made, terminal property on Lake Superior is now in negotiation, and it seems reasonably probable that the road will be put under construction within a few months. The St. Paul and the Minneapolis investors have a keen sense of the importance of their lake connections, and are anxious that they should be controlled by those who have like interests. As the local interest in the "Stickney" roads is strong, there is a disposition among local investors to push this new Lake Superior line.

Couplers for Continuous Heating.

The illustrations of the principal continuous heating couplings which are given on other pages of this issue serve to show the great variety of couplers used. Not only will no two of these eleven different patterns couple together, but the differences in the minimum size of orifice show the unsettled state of the question. While one inventor apparently considers the minimum orifice should be equal to that of a pipe 2 in. diameter, another believes that $\frac{1}{4}$ in. bore is sufficient, and there are all sorts of intermediate opinions expressed in size⁸ differing from one another by sixteenths of an inch. Some agreement as to the proper size of orifice must be arrived at before a uniform coupling can be adopted.

Another point of equal importance and difficulty is the question whether one line of pipe is better than two. The advantages and disadvantages of a return line of pipe to the engine are obvious. This method provides a means of re-evaporating the condensed water and insures a rapid and effective circulation, but only experience can demonstrate whether these advantages are so undisputably obtained as to over-

balance the increased complexity, cost and liability to leakage and derangement entailed by two lines of pipe, two lines of hose and possibly four couplings per car.

A coupler for steam heating should possess several qualities which are hard to combine in one coupler. The first and most important feature is that it should be tight against steam or condensed water. The coupling should be easily effected, and the coupler should be durable, and not easily rendered leaky by wear and heat.

If one line of pipe is used and the coupling is made beneath the platform, it is obvious that the couplers must be either directly above or directly below the brake coupling. If the former, any drip of condensed water is likely to freeze on the brake hose and coupling and cause trouble. If, on the other hand, the continuous heating coupler is below, it may be struck by badly trimmed ballast or snow, etc., on the track. It is, therefore, desirable that couplers should not be bulky, so as to leave plenty of clearance and guard against injury by striking against the brake hose, objects on the track, etc., when the cars are swinging round curves.

The question whether metallic flexible pipes should be used in preference to rubber hose is one that presses for no immediate solution, as it does not affect the interchange of cars. Any of the eleven couplers shown could be used with either flexible metallic pipes or with rubber hose.

The question as to whether a thermostatic trap is necessary on every coupler can also await the teachings of experience. A trap could with little difficulty be attached to any of the couplers shown, and be omitted from those using it without interfering with their powers of coupling.

The main points to be decided before a uniform coupler can be adopted appear to be four in number:

1. Is a return pipe necessary?
2. What is the minimum size of orifice?
3. Should the coupler be above or below the platform?
4. Which is the best coupler?

The whole question of continuous heating is new, and few of those holding responsible positions on railroads have had more than a very brief and limited experience with the actual working of any of the various methods of continuous heating.

A little systematic consideration of the types of couplers, and some careful observations as to their behavior during the coming winter, will do much however to solve the problem and guide the choice of the best coupler. It is to be hoped that joint action on the part of the railroads will then be prompt to generally adopt this coupler, and thus take the essential step to make continuous heating universal.

Reports have been gathered of the present practice in heating cars from railroads having a mileage of 51,259 miles and a passenger equipment of over 12,000 cars, including baggage, mail and express cars. From these reports we find 1,392 cars and 407 engines fitted with some apparatus for continuous heating by the use of steam taken from the locomotive. Subtracting from these about 1,000 cars and 260 engines belonging to the Manhattan Elevated, the remainder shows probably more than one-half of the equipment with which the surface roads are experimenting; although the number of cars equipped for trial is increasing daily, and we say that the figures show something like one-half of the experimental equipment, because we know, from various sources, of trials of which no official information has yet been given, and with pretty large numbers of cars.

Of the roads reporting (some 150 in all), only five or six state that they have actually adopted any of the systems now in use. Many are experimenting, and some are waiting to see the results of other people's experiments, while by far the greater number are either satisfied with some form of independent heater, or are not ready yet to express any opinion. It is not strange that this should be the case, when one considers the great diversity in couplings and the rapidity with which new systems of heating have been brought forward within the last year. Besides the various patented systems which have for some months been actively pushed, and which have become comparatively well known, it is found that several companies are trying systems of their own, or systems which are yet unheard of outside of two or three railroad offices. In fact, legislation and public opinion have forced this matter so fast that actual scientific experiment has not been able to keep up with the inventors. It is right and natural that the companies should have awaited the results of thorough trials before going to the great expense of equipping their passenger stock with devices which in a few months might be proved

to be inferior. It is, however, right that they should push experiments vigorously, and that is now being done, although the figures showing the cars heated by continuous systems are disappointingly small.

Of the independent systems reported as in use the Baker is, of course, much the most common. After that comes the Spear, and common stoves are reported as in use on but a very small percentage of the roads heard from.

The Taxation of Railroads.

The New York & New England report calls attention to the heavy burden of taxation imposed upon the railroad. Its taxes amounted to \$213,000, or over eleven per cent. of the net earnings, and about fifty per cent. of the surplus above fixed charges. This looks like an exceedingly large amount. But its unfairness seems to us to be the misfortune of the New York & New England Railroad rather than the fault of the Connecticut tax law. This law is somewhat peculiar, but in principle at least it is exceedingly good.

Almost all persons who have investigated the subject of railroad taxation agree that taxes should be assessed against corporations as a whole, and that they should be based on earning power in some form. The attempt to collect the tax from the individual stockholders or bondholders fails because such holdings are so carefully concealed from the assessors. The attempt to assess the individual pieces of property separately fails because the pieces of property have not a separate value. There was a time, not many years past, when to quote the report of an official committee of investigation, the difference in the assessment of the New York Central & Hudson River Railroad, where for all purposes that the road can be used it is of the same value to the company, was \$24,000 per mile. In other words, some localities assessed the company's real estate on the same basis as the surrounding real estate, others assessed it for its value as a trunk line. The difference between its value as cow pasture and its value as trunk line was quite sufficient to account for the difference. For local valuation the surrounding real estate furnishes the only proper standard. But this is manifestly inadequate. The road must be valued as a whole; and for this means state assessment—at least for most of the property—is better than local.

But on what principle shall state assessment be based? In many states the local assessments are corrected by a State Board of Equalization which exercises a pretty wide discretion in the matter. In a few others the State Board values the property in detail and then makes general corrections of its own result on some other standard. In New Jersey, for instance, the cost of duplication of the property is estimated, and then certain rather arbitrary corrections are made for the additional value of the franchise. But these methods are all somewhat cumbersome. It is better to take some method of estimating the value of the property as a whole, which may not be more correct but at any rate shall be more machine-like and automatic.

One favorite method is to base taxation on gross earnings. This is the Michigan system, and has the merit of simplicity and certainty. Its practical working is so convenient as to commend it to many of those who know most about the difficulties of the subject. But there are one or two serious objections to it. An obvious trouble is that it operates unfairly to a road whose expenses form a large proportion of its earnings. A less obvious but perhaps more serious difficulty is that it tends to prevent reductions in rates. Any such reduction usually increases gross earnings and operating expenses both. It is in the highest degree desirable for the community as well as for the railroad that such reductions shall be made as long as they do not interfere with net earnings. But the attempt to base taxation on gross earnings makes it a positive disadvantage for a road to handle a large traffic at low rates. A tax on net earnings becomes a burden only when the railroads are in a position to bear it. A tax on gross earnings burdens them not so much in proportion to their ability as in proportion to the amount of work that they do for the public.

But how shall the amount of net earnings be determined? In some states an effort is made to ascertain the amount directly; but the history of the contracts between the government and the Union Pacific shows the uncertainty involved in any such process. The difficulties in the way of such a method of assessment are almost decisive against it. It is better to ascertain indirectly the presumable amount of earning power. This is what the Massachusetts system attempts to do. Under this method railroads are assessed on the market value of their stock. If we deduct from this market value the valuation of property not used for railroad purposes and therefore

locally assessed, the difference represents the public estimate of the value of the railroad as a whole. It may be wrong; but it is at any rate the best obtainable estimate, and one which is made for purposes entirely independent of the state authorities. It is scarcely less simple than the Michigan system, and is in some respects fairer.

The Connecticut system differs from that of Massachusetts in assessing the railroads on the market value of their stock and debt instead of their stock alone. This seems at first sight unfair, but a single instance will show that it is sound in principle. Suppose that two railroads have each cost \$15,000,000 and are paying a fair return on the investment, so that their stock and bonds stand approximately at par. One road has \$5,000,000 stock and \$10,000,000 bonds, the other has \$10,000,000 stock and \$5,000,000 bonds. Under the Connecticut system the two would pay the same amount of taxes, which is right. Under the Massachusetts system the second road would pay twice as much as the first. Theoretically of course the difference might be made up by assessments on the bondholders; but practically we know how large a proportion of railroad bonds evade payment of taxes altogether. Now this difference is not merely unfair in itself, but it makes it desirable for railroads to have as large a proportion of debt and as small a proportion of stock as possible. Any one can see that this is bad. For various reasons the practical effects in Massachusetts have not been very great, but the tendency exists and if the system prevailed over the whole country its results would be serious. If the valuation of the securities is to be taken as an indication of the earning power of the property—and that is the theory of the Massachusetts system—the tax should be based on the valuation of all securities, as in Connecticut, and not a part of them only, as in Massachusetts.

The New York & New England is in a specially unfortunate position under the Connecticut law, because it has a large bonded debt contracted at high rates of interest, and at the same time a stock which is valuable for purposes of controlling the property independent of its probable earning power. We do not think all this constitutes a good ground of complaint against the law. The fact that the railroad can pay its heavy interest charges and still have something left shows that the earning power of the property is high. The fact that a certain set of men deem it important to control the company independent of its earning power or of its value as an investment is doubtless unfortunate for them, but it does not seem to us a legitimate ground why they should be exempted from taxation. The very fact that the Connecticut system of taxation renders purchases of stock for purposes of control a costly luxury, is rather in its favor than otherwise.

The Block System on Roads of Medium Traffic.

The disastrous rear collision at Kouts, Ind., on the Chicago & Atlantic in October, showed forcibly the value of the absolute block system. Most rear collisions between trains on the open road result either from inefficiency of the man or men charged with signaling or from too fast running by the train that is signaled. Superintendents have endeavored to cure this evil to a certain extent by the use of fixed signals, and many thousands of dollars have been spent within the last few years in the erection and maintenance of station distant signals. The theory is that a brakeman, having the means at hand to show a danger signal a good distance in the rear at once and with no effort worth mentioning, can have no such excuse for neglecting the duty as he often claims to have for not going back with a flag or lantern; and that enginemen, knowing just where to expect a danger signal, and depending on always finding it in just the same place, can have no excuse for running too far by it. The argument that the steepness of the grade was greater than had been realized or that stopping in an unfamiliar place proved more difficult than had been anticipated, or that the danger signal was not shown in the proper position, has no weight in the case of a fixed signal which has been made familiar by years of use. Without stopping here to criticize the too-frequent blunder of establishing costly signals and neutralizing their good effect by regulations for their use which are exceedingly difficult to carry out, it is sufficient for the present purpose to note that, in spite of the existence and use of such signals (praiseworthy as far as it goes) on the Chicago & Atlantic this disastrous collision did occur, and nine people were killed. And, one method of protection having failed, many people will anxiously turn to something different.

We referred to this matter in these columns Oct. 14, though the types perverted the meaning of one of the

principal sentences by substituting the word *through* for *thin*; and we have since received testimony to the satisfactory results obtained with the block system on the Canadian Pacific. From the statement printed in another column, it will be seen that a noteworthy step in the right direction has been taken on that road, and that several years' experience has confirmed the favorable opinion of the system which induced its first adoption. No one questions the feasibility of a plan of this sort on such a road as the western section of the Canadian Pacific, where there are not more than two or three trains a day; the simple reason that nothing of the kind is generally adopted on such roads being that collisions are so infrequent that managers have not deemed any extra precaution necessary. But where trains are as numerous as on the Eastern division, between Montreal and Ottawa, which is fully as well occupied as are thousand of miles in the United States, the general opinion seems to have been that any blocking of this kind would either cost more than it would be worth, or else would delay trains and waste more of their time than would be permissible. Without attempting to decide from the experience of a single road just how far this method of protection is expedient and profitable, or just what degree of activity warrants a more perfect system and how small a road must be to render the system too expensive, it may be said that there are at least occasional times on nearly every road in the Northern United States when a safeguard of this kind would be invaluable, and that the method of putting in practice a station-to-station block, its cost and its actual working should be positively learned by trial on all roads which have not already a safer system. We have spoken heretofore of the necessity of a block system in order to avoid cruelty to flagmen in severe weather. This reason exists not in the extreme North only; roads in New England, New York and Illinois, as well as in states further North, experience weather nearly every winter wherein it is inhuman to compel a man to stand still outdoors for any length of time, and surely cruel to send him out where he is exposed for an hour or two, even in motion. A cognate necessity for the use of the block system arises when a snow-plow must be run through drifts in dark nights when there is a strong likelihood that a red light, however faithfully exhibited, would not be seen. Moreover, these are just the circumstances under which one would be most reluctant to place entire dependence upon torpedoes. Freight trains, which in "bad wheeling" through troublesome snow cannot be got over the road according to rule (that is, with speed under such control as to admit of stopping within the required distance after passing a danger signal), could often be taken through with perfect safety if assured of a clear track, so that the speed could be increased before reaching the hard places. And this suggests a use for the block system in every-day work, winter or summer, which ought to be recognized more than it is; we refer to the running of heavy freight trains down long grades. The power brake will spoil our argument on this point, in the near future, we hope; but it unfortunately has not much bearing at present, and the remedy here proposed is unlike a train brake, in that it is at once available without any large investment. The superintendent of a prominent road who at a recent meeting said that his trains were unable (on the steeper grades) to stop in less than two miles, voiced a truth which, without doubt, applies to a good many roads besides his own. A five-minute interval between trains is not long enough to allow much margin for miscalculations, and some of the accounts of rear collisions bear indications that the following train had none too much time (if it had enough) to stop in, however faithfully the flagging may have been done. By the aid of the block system trains can be safely run over such roads as this and in some cases the speed could doubtless be increased to advantage. Then again heavy trains could be helped in ascending long and steep grades; often a conductor almost knows when starting that he will be stopped before reaching the summit by some cause which will necessitate the brakeman's going back; but a heavy train cannot be handled with a scant force of brakemen, and so when the stoppage comes the flagging is neglected. Following trains are pretty sure to come slowly and so the risk is taken, though rear collisions do occur on up grades. All this uncertainty could be obviated by having the agent at the foot of the grade hold trains; and if he were to regularly set his switch for the side track he would once in a while prevent one of those collisions which result from detached cars running back down grade and meeting a following train.

To sum up, then, every road needs the block system occasionally, and many of them ought to have it regularly on some portions of their line every winter;

while its use as a regular thing at all times is well worthy of careful consideration. The Canadian Pacific's system is open to criticism, as will be readily seen; some points in that line will be considered in a future number.

The Erie's Annual Report.

The report of the New York, Lake Erie & Western for the year ending Sept. 30, 1887, has just been issued, and is one of the most comprehensive in statements and comparisons that has been presented for the consideration of the stock and bondholders.

A new feature which President King has introduced in this report is that stating the gross earnings of the main line and all branches combined, instead of including only the percentages which accrued to the parent company from the branches that were operated on a percentage basis.

This statement shows that the gross earnings of the whole system amounted to \$26,567,859, and that there remained after deducting percentages due leased lines (\$2,357,501) and working expenses (\$17,390,673) net earnings from traffic amounting to \$6,819,685, in addition to which there were earnings from other sources amounting to \$940,658, making the total amount available for payment of interest on funded debt and fixed rentals of leased lines, \$7,760,343. These fixed charges amounted to \$7,158,544, thus leaving a surplus for the year over all of \$601,799, as against a surplus in the preceding year of \$14,611, and a deficit in 1885 of \$1,376,944. The gross earnings show an increase over 1886 of 7.35 per cent., and an increase over 1885 of 27.52 per cent. The working expenses were 6.11 per cent. more than in 1886, and 21.21 more than in 1885.

From this it will be seen that the expenses did not increase in proportion to the earnings, notwithstanding unusual expenditures made for repairs, renewals and improvements, which were charged to expenses. Amongst these were the cost of 22,266 tons of new steel rails, 1,006 improved frogs, 828 safety switches, 934,420 cross ties, 245 miles of ballast, new station buildings at Jersey City and Rochester, improvements in the yards at Bergen and Port Jervis, etc.

The percentage of operating expenses to earnings was in 1885, 68.87; in 1886, 66.20, and in 1887, 65.46.

The earnings of the Erie and branches, exclusive of the New York, Pennsylvania & Ohio, were \$19,882,071, being an increase over 1886 of \$1,571,576, or 8.58 per cent., against an increase in the operating expenses of 7.34 per cent. The revenue from merchandise freight increased 9.46 per cent.; from coal, 11.16 per cent.; from passengers, 7.62 per cent. The net earnings, excluding the New York, Pennsylvania & Ohio, were \$6,701,397, an increase of 11.11 per cent., and the percentage of operating expenses to earnings 66.29 per cent., a decrease of 0.77 per cent. from 1886.

The net earnings of 1887, upon a basis of about one-fourth the volume of traffic, at about three times the rate for freight, and a much higher rate for passengers, were \$4,005,996, and the percentage of operating expenses to earnings 72.20. In 1877 the net earnings were \$3,809,050, with about one-half the freight traffic, and one-third higher rate for it, and the percentage of operating expenses 74.10 per cent. If, therefore, we compare the percentages of operating expenses of these two years with that of 1887, we find a great gain, although the rate per ton per mile was 1.810 cents in 1868, 0.955 cent in 1877, and 0.637 cent in 1887.

The increase in the traffic over 1886 was general, as follows: Passengers, 9.66 per cent.; passengers one mile, 2.67 per cent.; merchandise freight, 7.53 per cent.; coal, 9.75 per cent.; tons merchandise freight one mile, 7.62 per cent.; and tons coal one mile, 4.35 per cent.

Special attention is called by the President to the enormous increase in the coal traffic. In 1878, 2,850,106 tons were transported; in 1885, 6,137,342; in 1886 this tonnage suddenly increased to 8,008,158, and in 1887 further advanced to 8,789,158 tons, 7,009,566 of which was anthracite. The increase in per cent. over 1878 is 208.38. These figures show the wonderful development of this traffic, and suggest that the management must have had all it could do to supply equipment necessary for the transportation of this product during the last two years.

The course of the whole freight traffic is best shown by examining the following table, viz.:

Years ending Sept. 30.	Tons.	Tons carried one mile.	Earnings.	
			Amount.	Per ton per mile.
1878.....	6,150,468	1,224,763,718	\$11,914,489.72	.973
1879.....	8,212,641	1,569,222,417	12,233,460.09	.780
1880.....	8,715,892	1,721,112,095	14,391,115.33	.836
1881.....	11,086,823	1,984,394,855	15,979,576.61	.805
1882.....	11,895,238	1,954,389,710	14,612,128.38	.749
1883.....	11,965,490	1,979,448,428	15,562,140.97	.780
1884.....	11,071,938	1,794,946,519	12,903,156.56	.719
1885.....	10,253,489	1,687,546,688	11,071,709.52	.659
1886.....	12,806,918	2,058,394,022	13,572,140.21	.659
1887.....	13,949,260	2,183,734,855	14,996,674.12	.687

From this it will be seen that since 1878 the tons have more than doubled, and the tons one mile increased about 78 per cent. It will be noticed that in 1881 and 1883 the tons one mile, in each year, were about 200,000,000 less than in 1887, yet the earnings in 1881 were \$15,979,577, and in 1883 \$15,562,141, as against \$14,996,674 in 1887. The decline in the average rate per ton per mile of course accounts for the less earnings. This decrease, however, has been overcome by a somewhat greater decrease proportionately in cost per ton per mile, which is now 0.452 cent, as against 0.752 in 1877. In 1886 the cost per ton per mile was 0.448 cent.

The report for this last fiscal year shows the greatest tonnage and tonnage movement in the history of the road.

The through passenger business has decreased somewhat, but the local business has increased 11.1 per cent., to 6,388,720 passengers. The local passengers were 93.05 per cent. of the total. The earnings per passenger per mile

increased 3.97 per cent. to an average of 1.939 cents. Much has been done in the last two years to develop the suburban traffic. More frequent trains have been run, unusually attractive and comfortable cars have been put on the suburban runs, new stations have been made and fares have been reduced. The sale of family tickets at materially reduced rates has undoubtedly been an important element in creating revenue for trains which ordinarily run light, that is, for trains running in the hours when there is little commutation travel.

It is mentioned by the President that the road now has in service 49 anthracite burning locomotives. This fact, together with the stone ballast, and interlocking and block signals lately put in on the eastern end must count for much in the comfort of passengers and in the increase of the remunerative suburban business.

The increase in the average tons of freight per train since 1877 is remarkable. In that year the average freight train load was 145 tons, while in 1887 it was 275 tons. This improvement has been effected by the use of heavy consolidation locomotives.

The operation of the New York, Penn. & Ohio resulted in a profit for the year of \$118,286, as against \$80,321 last year. The modification of the lease of this road, whereby instead of paying 50 per cent. of all gross earnings above \$6,000,000 per annum, the Erie pays for every increase of \$100,000 over that amount an additional one-tenth of one per cent. until the percentage reaches 33½, which is the maximum, seems to be for the best interests of both parties.

Under the old arrangement every dollar earned over the \$6,000,000 entailed a loss to the Erie, as the operating expenses under no circumstances could be reduced to meet such a division of the earnings. Therefore, it would have been to its interest to encourage through business above that amount by other routes, whereby the N. Y. & O. would have been entirely deprived of its percentage on the gross earnings over the \$6,000,000.

The large expenditures on account of repairs and improvements must have a good effect, by requiring decreased outlays in succeeding years. Taken as a whole, the report makes a very favorable showing.

In the annual report of the East Tennessee, Virginia & Georgia appears the recommendation that 7,000 tons of 65-lb. steel rail be purchased and laid upon the East Tennessee Division, releasing 6,000 tons of 56-lb. steel rails fit for use on other divisions. It is also recommended that a portion at least of the Braswell Tunnel be arched during the coming year. The work of filling in the trestles on the Georgia Division has been begun, and it is recommended that the work be continued in order that there may be the least possible amount of rebuilding in wood. Over 3,300 feet of old wooden bridges have been replaced by iron during the year, and about 5,000 feet of wooden bridges and trestles have been rebuilt. There is likely to be considerable building done in stations and shops.

Nearly 6,000 tons of steel rails were laid last year, and 24 consolidation engines were under contract for delivery in 1887.

The Vice-President makes the following comment on the Inter-state Commerce law and the action of the Commissioners:

When the law went into effect, it was feared that the fourth, or so-called "long and short haul" section of the law would be so construed as to practically prohibit the railroads from competing with the water lines. The enforcement of the law in accordance with this construction would have ruined a large number of the railroads of the South, and would have produced widespread commercial disaster in that section of the country. Happily these disasters have so far been averted by a rational construction and a wise administration of the law on the part of the able Inter-state Commerce Commissioners.

The company operated 1,033 miles of road. The percentage of operating expenses, which was 67.79 in 1885, 63.63 in 1886, was 66.42 in 1887. The increase in the operating expenses for the last fiscal year was in part due to the item of \$212,621 for extraordinary expenses in maintenance of way and equipment. Beyond the betterments thus charged to expenses \$789,363 has been expended in construction and equipment.

An abstract of the report, showing results of operation, will be found in another column. The reports of the General Superintendent and the Auditor are unusually full in detailed information.

The switching at the Union Stock Yards, Chicago, which from Dec. 1 is to be done by the Stock Yards Co. with engines hired from the railroads, is a quite complicated business, and the present action seems to be somewhat experimental, no great investment being involved in the new arrangement. The engines are to be housed in the houses of the respective roads as heretofore, and supplies are to be got from them, in a manner similar to that which was pursued by old-time country school teachers in "boarding-around." The roads continue delivering their own live stock to the yards and take away their empties, but all switching at the yards proper and between the packing houses is to be done by the Union Stock Yards Co., as well as the transferring to and from the roads of all freight except live stock. It is expected that the new arrangement will result in additional economy of working, and the statement that more effective discipline—better provision against strikes—is one of the objects aimed at is doubtless true, though the railroads do not avow any such motive.

The work is expected to require about 14 engines in the daytime and 5 during the night. Messrs. H. F. Royce, Chicago, Rock Island & Pacific; C. D. Law, Pittsburgh, Fort Wayne & Chicago; P. P. Wright, Lake Shore & Michigan

Southern; J. D. Besler, Chicago, Burlington & Quincy, and K. H. Wade, Wabash, are the executive committee of the railroads to supervise the transactions with the Stock Yards Co., and some of the rules are as follows:

Each road will place all cars which they may wish switched to the various industries upon the designated delivering and receiving tracks at the Stock Yards, and the Union Stock Yards Co. will do such switching at cost, cost being understood to include the rental and maintenance of engines, payment of yardmasters, engine crews, switchmen, switch tenders and other necessary employees and incidental expenses. The cost of transacting the above business shall be divided among all the lines in accordance with the number of loaded cars handled for each road. Bills shall be rendered monthly and shall be audited by the Executive Committee. It is understood that each railroad will take its own live stock, with its own engines, direct to the unloading chutes with no charge for trackage, either going or returning. Ice, when in ten car lots or over, may be taken by each railroad, with its own engines, direct to destination.

The different railroad companies will rent to the Stock Yards Co. switch engines at the rate of \$10 per engine per day of 24 hours, for every day in the month; running repairs on such engines shall be borne by the Stock Yards Co., and the engines returned to their owners in as good condition as when received, ordinary wear and tear excepted. The charge for engine service, namely: wiping, hosteling, firing-up, clinkering, sanding (including sand), inspecting, sweeping, kindling (including wood), boiler washing (once each week), water (one tank), turning and housing, shall be three (\$3) dollars per day per engine. Each company housing engines shall furnish the coal, and charge for the same at actual cost at the mine, plus a reasonable sum to cover freight and cost of handling.

Small supplies, such as oil and waste, furnished an engine by the company housing the same shall be charged for at the same rate as the road furnishing the same charges to its own engines.

Railroads which transfer freight to and from each other through the Stock Yards will continue the same practice without change. The Stock Yards Co. furnishes the general offices; damages from accidents are to be charged to the joint account and a system of uniform train-lists and car cards is provided.

The Chicago, Burlington & Quincy has quickened its passenger time between Chicago and Denver, making it 34 hours, notwithstanding the appeals of other roads which wished to continue the old schedules. It is said that the Denver & Rio Grande has also determined to accelerate its through trains. The Union Pacific's through trains now leave Omaha at 10:30 a. m. and 8:20 p. m., the first named being run at the former passenger speed and carrying all classes of passengers, while the evening train, which makes the quicker time, will take none but first-class. The time of east-bound trains has not been shortened. We do not learn that the roads east of the Missouri other than the Burlington have made any change.

Several cheap narrow gauge railroads have been lately built in Ireland, under a special act of Parliament, which relaxes the stringency of the usual regulations as to signals, level crossings, fences, etc. Some portions of the lines run close alongside highways, and the locomotive side rods, cross-head, etc., are hidden from sight by hinged flaps, so as not to frighten horses.

One of these lines, the Cavan, Leitrim & Roscommon Light Railway, has recently been completed at a cost of \$18,500 per mile. The line is well ballasted and drained and all bridges, stations, etc., are built in a substantial and durable manner of stone, etc.

Electric lighting of trains receives appreciative attention in Canada. The first train in the Dominion to be so lighted (which was mentioned in our columns two weeks ago) is regularly running between Montreal and Ottawa. A Pullman drawing room car, one first-class car and one second class are fitted with incandescent lamps and Julien storage batteries. There are 19 lamps in each of the two former cars and 13 in the latter. The arrangement is very similar to that in use on the Boston & Albany, except in the novel manner in which the second-class car is lighted from the batteries in the first-class car. This is done by a flexible connection between the two cars, attached to sockets on each. An ingenious arrangement of rubber valves covers the terminals when not in use, so as to prevent the deposition of moisture or dust. When arrangements are completed trains will run from Halifax and St. John to Quebec and Montreal, lighted by electricity and heated by steam. The batteries will be removed from the cars for charging, which will be done at Halifax, Moncton, St. John, Point Levi and Montreal. It is reported that the Canadian government has appropriated for electric lighting and steam heating on the Intercolonial the sum of \$24,500, and that road is actively at work equipping two trains with Julien storage batteries.

An object lesson in temperance was discerned by a Boston correspondent of a country paper in a circumstance which occurred at the Boston trials of the Westinghouse Brake. One of the party on the excursion train had his finger jammed so severely as to cause fainting; a call was made for a flask of brandy or other stimulant but none could be found on the train! The correspondent justly praises the superintendents among the party for practicing what they preach to their trainmen.

The "Southern Express," or, as they call it on the Continent, the "Sud-express," from London to Lisbon, runs through cars on the continental lines from Calais, but with a transfer of trucks on the Spanish frontier, because of the wider gauge of Spanish roads. This express is owned by the Great International Co., which now runs trains to Havre, Calais, St. Petersburg on the north and Brindisi on the south. It is said to have a capital of \$3,000,000, which will now be increased to meet the cost of additional cars for Russian lines. As an illustration of its value, it is attempting

to make the time by its new express, shorter from London to Lisbon than the connecting lines have been able to make, largely owing to delays on the frontier and other political obstacles, from Paris to Seville. Its *train de luxe*—three sleeping cars costing \$12,500 apiece, a restaurant car, a freight car, to carry its supplies, and one baggage car—does not read in this country as any very remarkable outfit, but for Spain it must be a great advance on former accommodations. The chief object of the train is to connect with steamers to the Cape of Good Hope and South Africa, by which about 24 hours may be saved. The train will only be run once a week.

TRADE CATALOGUES.

The Martin Anti-fire Car Heating Co., of Dunkirk, N. Y., have issued a well illustrated catalogue describing their device. The letter press includes not only a full description, but an essay on the subject by Mr. C. Powell Kerr, of New York, who gives full calculations and figures as to the amount of radiating surface, etc., required in car-heating, with the consumption of steam and fuel required. He states that 9.3 lbs. of coal per car per hour is an average consumption. He, however, makes a somewhat serious error in assuming that coal costs 1½ cents per pound, and consequently that heating a car by steam costs 10.6 cents per hour for fuel alone.

Coal at 1½ cents per pound would cost \$30 per ton, which is a price at which railroad operations of any kind would be somewhat difficult and decidedly unprofitable. If car heating were to cost 10 cents per car per hour, the expense of heating a train of 10 cars running at an average speed of 25 miles per hour would be 4 cents per train mile. As the whole expense of repairing passenger cars and passenger car shops is generally under 12 cents per passenger train mile, the expense of heating would be a somewhat formidable addition to present working expenses. The expense of heating passenger cars on the Pennsylvania Railroad is, according to the figures in their annual reports, about 0.4 cent per passenger train mile, or one-tenth of the amount shown by Mr. Carr's figures. It is evident that some grave error has been made.

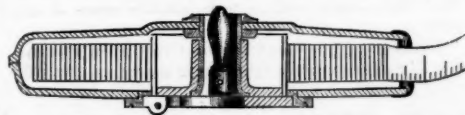
Assuming that the amount of steam needed requires the combustion of 10 lbs. of coal per car per hour, the amount of fuel required to heat a train of 10 cars will be 100 lbs. per hour. At an average speed of 25 miles per hour this is equal to 4 lbs. per passenger train mile, and taking coal at \$5 per ton, the cost would be 1 cent per train mile during the winter. As, however, cars are only heated for about five months in the year, the cost on the annual train mileage would be about ⅔ cent, which closely coincides with the figures shown in the Pennsylvania annual reports, which of course give the expense of heating cars by stoves.

As, however, the average train is nearer five than ten cars, and coal can generally be bought for less than \$5 per ton, there can be little doubt that the average cost of steam heating would be even less than these figures, as it seems to be pretty generally agreed that the combustion of some 8 to 10 lbs. of coal on the locomotive will generate enough steam to heat one car one hour. Continuous heating will, therefore, as regards the consumption of fuel, be considerably cheaper than the present method of heating by stoves.

The Hall Manufacturing Co., of Philadelphia, issue a neat little pamphlet, giving illustrations and descriptions of a variety of emery grinders suitable for different uses.

Patent Centre, with Flush Folding Handle, for Tapes.

The old style centre for steel tapes is of small diameter, and consequently that part of the tape immediately adjoining it is coiled very closely in winding up, which is injurious to the steel. Again, the operation of opening the old handle is an inconvenient one, frequently performed at the expense of fluger nails. The new centre, manufactured by Messrs. Keuffel & Esser, and represented in the annexed cut, has a



large drum in order to avoid too close coiling. While the diameter of the tape case is not materially increased, it is clear that the further advantage of more rapid winding is obtained. In the place of the old metal button there is substituted a long swiveling handle which protrudes through the centre of the case, so that the crank can be thrown open by pressing against the projecting end of the handle, while at the same time, by the greater length of the crank, more leverage is obtained.

THE SCRAP HEAP.

And there He Sticks.

An exchange says that one Herbert C. Jones, an attorney in Toronto, Ont., has a scheme for building a road from Portland, Oregon, to Alaska, under the name of the Canadian & American Coast Line Railroad Co. The capital stock of the company has been fixed at \$50,000,000. The road will start at Portland, wind sinuously along through Tacoma, Seattle, and Vancouver, thence through British Columbia, sticking well to the coast, till at last it terminates at Juneau, in Southern Alaska. The idea appears nearly practical, though a trifle cold. "Sticking well to the coast" is its chief drawback. A road may have the best intentions about sticking to a coast, but the chances are that the coast will make no effort to stick to the road, and thereby will be occasioned some embarrassment. Any advice that we may be allowed to offer in the matter would be for Mr. Jones to stick to the toboggan coasts of Toronto, and also to his \$50,000,000 capital stock.

East St. Louis Companies.

The *Iron Age* states that the first ten months of the present year the state of Illinois granted charters to no less than 131 East St. Louis companies, with an aggregate authorized stock of \$191,000,000. These companies were organized for manufacturing purposes, to run steamship lines, to build bridges, to dig the precious metals, etc. If all the enterprises born there were by any possibility to grow in that city for even a very little while it would soon be a rival to Chicago. Investigation has shown that East St. Louis is but a name, so far as these corporations are concerned. Nearly all its corporations are runaways from Missouri, seeking easy laws under which to be formed, as well as evading taxation. Under the law of Missouri every corporation formed in the state shall have at least one-half of its capital stock paid up before a charter will be issued, while the fee is \$50 for a capital of \$50,000 or under, and \$10 additional for every \$10,000 additional stock. In Illinois a charter of incorporation for any company, with a capital of any amount, can be secured by paying a small fee, and no questions will be asked about paid-up stock. It is therefore not difficult to understand why so many corporations hail from the Illinois suburb of St. Louis.

Deciding a Burning Question.

A good sort of advertisement, better than a "cut in rates" to assure passengers, would be the announcement that the passenger trains on the "X and Q" road is heated by steam "from the engine." The "G. P. A.," on a notice announcing such an improvement will be interpreted to mean "Great Passenger Attraction." Wherever those initials are signed to an announcement that the stove is abolished, there the passengers will go, in preference to the parallel and competing road, if the latter keeps in blast that deadly apparatus. A few years hence people will look back on the kerosene-lighted and red-hot-coal-heated train tinner-boxes with amazement, as so many libels on the civilization of the age.—*Philadelphia Ledger*.

"Keeps in blast" is good.

Prizes to Station Agents.

The directors of the Boston & Maine have awarded the following prizes to station agents for care of station grounds in 1877 and for floral displays: First prize, \$50, to the station agents at Atkinson, Madbury and Kennebunk; second prize, \$30, to N. B. Ross, Bell Rock station; H. C. Taft, Gloucester; J. E. George, Newton Junction; C. E. Thompson, Howes Station. Third prizes, \$20, to Charles Brown, South Georgetown; L. D. Sinclair, Ossipee; G. F. Kingman, West Manchester; Edward A. Fergusson, Portsmouth engine house; F. A. Parshall, Wamesit; C. L. Martin, Reading; J. F. Akreman, engine house, Prison Point. Fourth prizes, \$15, to Charles H. Marland, Ballardvale; Charles E. Rogers, Byfield; Charles M. Bancroft, Reading Highlands. The judges were James R. Nichols, Nathaniel J. Bradlee, Mrs. J. R. Nichols, Annie M. Bradlee, Mrs. W. S. Stevens.

A Medal for Bravery.

Engineer H. W. Elliott, of the limited express on the Alabama Great Southern road, was presented with a handsome gold medal last week in Chattanooga, Tenn., by the passengers on the train on Oct. 18, for brave conduct in preventing an accident at Caldwell. The train was about to run into a car filled with fish plates, which had been placed on the road by wreckers. Elliott stood at his post, reversed the engine and prevented a collision.

A Bit of Kansas Law.

The Kansas Railroad Commissioners have just decided that when two roads cross each other they must enjoy equal rights and privileges, and the road first built cannot dictate terms to the road which desires to cross its track; also that the first built road cannot claim from the road crossing its track any damage for increased expense caused by the necessity of stopping trains at the crossing.

To Build a Road in the Argentine Republic.

Henry Mactier, a civil engineer of Philadelphia, will sail for South America on Dec. 13, to project a railroad for a syndicate of English capitalists. His destination is Buenos Ayres, Argentine Republic. The proposed road, with its branches, will extend from Buenos Ayres to Pergamino and Cordoba, a distance of 450 miles across the pampas. The Government has granted a subsidy of \$700,000 and a guarantee of 6 per cent. annual income upon the investment.

In the Grand Central Depot.

"Does this line of people begin at the Battery?" was asked at the ticket office window of the Grand Central station the other day.

"Out in midocean, I should judge," was the laconic reply of the jumping-jack inside the window, who flew from side to side playing a wild game of tickets and coins on the broad sill, as the line passed between him and the brass rail outside.

"Move on into the corner to count your change," the stalwart policeman on the outside whispers to any one who dallies a fraction of a second in front of the cage.

Men sweep the whole of their change together with their left hands. Women invariably stop to count the pieces in a dazed, fumbling sort of way born of suspicion, nervousness, tight gloves and many packages.

Now and again a neat little tailor-made Boston girl sweeps off the change like any young dupe, bettering him by having a neat little purse in her left hand, which snaps viciously as she tilts her nose and her oxidized silver umbrella handle toward the big chandelier and passes by.

"From ten to fifteen thousand people pass by between this window and that brass rod daily," gasped the jumping-jack, wiping the perspiration from his brow as the gong sounded and the last man tore through the gate, his cane punching into the stomach of the big fat policeman, and his coat tail pocket catching on the complacent brass knob. "The work is divided between three men."

"Don't you find coins very inconvenient for hasty handling?"

"An infernal nuisance. I wish all money was in cardboard like tickets. We have so many pennies, too, because we charge a fixed rate per mile."—*N. Y. Sun*.

First of the Season.

West-bound trains on the Atchison, Topeka & Santa Fe became snow-bound near Dodge City, Kan., on Nov. 27. The storm in that vicinity was very severe and the wind did a great deal of damage to the telegraph wires.

Pennsylvania Employees' Saving Fund.

At a recent meeting of Pennsylvania Railroad directors in Philadelphia it was agreed to start a trust saving fund for the benefit of the employees of the company. Amounts from \$5 upwards may be deposited under the plan and will draw interest at the rate of 4 per cent. per annum. All station agents of the company are authorized to receive the deposits.

German Mileage Tickets.

Herr George Wille, of Hanover, Germany, has submitted to the Board of Trade, at Hildesheim, a plan which aims at a reform in the ticket system. He recommends the issue by the German railroads of so-called "kilometer coupons," namely, of traveling booklets for distances of 1,000, 2,000 and 5,000 kilometers, in handy coupons of 1, 5, 10, 50 and 100 kilometers. On these the purchaser is to have a reduc-

tion of fare of 25 per cent. for 1,000 kilometers, 33 1/2 per cent. on 2,000 kilometers and 50 per cent. on 5,000 kilometers—a reduction which corresponds to that of the present round, return and summer tickets. The coupons are to be taken in payment at all the ticket offices; the owner of a booklet, which is made personal, is to be recognized by his photograph therein inserted, with his signature attached; each coupon has to have the exact number of kilometers for which it is valid stamped upon it, and in case of death or inability to continue the journey the railroad is to redeem the unused coupons, be it to the owner himself or his heirs.

TECHNICAL.

Locomotive Building.

The Manchester Locomotive Works received a large order last week from the Atchison, Topeka & Santa Fe. The Hinkley Locomotive Co., of Boston, is building 10 locomotives for the Kings County Elevated, of Brooklyn, N. Y., of the Forney pattern; also a 10-wheel locomotive for the Chicago, Burlington & Northern.

The Car Shops.

The Lebanon (Pa.) Car Works have received an order for several hundred gondola cars from the Pennsylvania. The shops of the lines west of Pittsburgh are so crowded that a large contract for repairs has been given by the Pennsylvania Company to the Erie Car Works, Erie, Pa. The Boston & Albany road is to put in the Westinghouse freight train brake on 120 stock cars.

Bridge Notes.

The contract to build the iron bridge across the Brazos River, Tex., has been awarded to the King Iron Bridge & Manufacturing Co., of Cleveland, O., at \$49,500. It will be 560 ft. long.

The Charleston Bridge Co. has been chartered at Charleston, W. Va., to build a bridge across the Kanawha River by R. M. Carr and S. M. Snyder, of Charleston, and others. The capital stock is \$50,000.

Bids are invited for iron bridge construction on one iron draw span, 192 ft. long, two fixed spans of 110 ft. each, about 900 lineal ft. of iron or Howe truss spans, with masonry piers and pile foundations, across the Menominee River in cities of Menominee, Mich., and Marinette, Wis. Address R. E. Farnham, C. E., 234 La Salle street, Chicago, Ill., until Dec. 8.

The New Jersey & Santo Domingo City Bridge Co. was incorporated this week under the laws of New Jersey. Its purpose is to build an iron bridge across the Ozama River at Santo Domingo City under a concession made to the company by that city. The directors are: Nathaniel McKay, W. H. Davis, C. S. Bushnell, John B. Pope and C. W. McKay.

Manufacturing and Business.

The National Locomotive Spark-Arrester Co. has been incorporated in Illinois; capital stock, \$150,000; incorporators, Thomas Plunkett, W. R. Paige and I. H. Kennard.

The Dunham Manufacturing Co., of Boston, reports several large contracts for its freight car door with Western companies.

The Australasian Ironmonger notes the fact that the Rand rock drill is now extensively used in Australia. More than 30 different parties in New South Wales, Victoria, Tasmania and Queensland are now employing the drills and explosives manufactured by the Rand Company.

The Bridgeport Boiler Works, of Bridgeport, Conn., are about to ship one of the Lowe feed-water heaters and purifiers of 500 horse-power capacity to the Soldiers' Home, Leavenworth, Kan.

The Davis Carbon Manufacturing Co., of East St. Louis, Ill., capital stock \$100,000, has been incorporated by John Henry Davis, Israel E. Russell and Simeon Lord.

The Edison Gauge Co., of New York, has recently supplied its recording steam gauges to the new City Hall buildings in Philadelphia; the Palmer House Chicago; Durham water-works, North Carolina; Texarkana water-works, Texas.

The Kansas City (Mo.) Switch & Frog Works began operation last week with a force of 100 men.

The Union Indurated Fibre Co., of New York, is manufacturing pails and tubs of a material called "Fiberite." This is designed for the purpose of handling acids and other strong liquids, to which it is impervious.

A contract for two pumping engines of 15,000,000 gallons capacity each, for the city water-works at Minneapolis, Minn., has been let to Henry R. Worthington, of New York.

The Putnam Machine Co., of Fitchburg, Mass., are building for their own use a 125 horse-power engine. They are also making improvements at their works which will include new engine, boiler and drafting rooms.

W. A. Harris, builder of the Harris-Corliss engine, Providence, R. I., has recently completed and shipped to the Middlesex Electric Light Co., Lowell, Mass., a pair of 18 by 42 high pressure engines of 300 horse-power. Also one 18 by 48, 175 horse-power, of the same pattern to the Washburn & Moen Mfg. Co., Worcester, Mass.

The Grand Trunk will try the Martin system on the Cornwall Branch and the Lowell on the Ottawa section.

Iron and Steel.

The Cheraw Iron Works have been organized at Cheraw, S. C., with H. L. Louchin as President, and W. A. Hinshaw Superintendent. Work on buildings will be commenced at once.

The Glendon Iron Wheel Co., of Toledo, O., is building a \$200,000 factory, and the foundations have been laid for the new rail mill, 350 by 100 ft., at Jackson, O.

The Troy Steel Works, of Troy, N. Y., started up last week with a full complement of men.

The Farnel Foundry & Machine Co. will build an addition to its foundry at Ansonia, Conn.

The Landore Siemens Steel Company, of South Wales, furnished 5,000 tons of the steel used in the Poughkeepsie bridge.

The Mount Vernon Furnace, at Ironton, O., formerly operated by George N. Gray, will be operated by the Campbell Iron Co., of Ironton, next year.

The Vulcan Iron Works, of Chicago, Ill., have been awarded the contract, through Messrs. Geo. S. Morison and E. L. Corbell, engineers, of New York and Chicago, for all the machinery for operating a drawbridge over the Willamette River, at Portland, Ore., for the Oregon Railway & Navigation Co.

The Oregon Railway & Navigation Co. will build a foundry in connection with its machine shops at Grant's Pass, Ore.

The Tudor Iron Works, at St. Louis, have recently added to their plant a Smith regenerative gas furnace built by Smith & Laughlin, metallurgical engineers, of Pittsburgh.

The Portland Rolling Mill Co., at Portland, Me., is turning out a large quantity of angle iron for the Berlin Iron Bridge Co., at Berlin, Conn.

The Swindell Construction Co., of Pittsburgh, recently received a contract from the Pennsylvania Construction Co., of Uniontown, Pa., for a 20-ton ore melting furnace, which will be used for the melting of rolls.

The Bowling Green Rolling Mill Co., Youngstown, Ohio,

has all the buildings completed for its plant, and is now putting the machinery in. The plant will consist of 9-in. and 18-in. finishing mills, 20-in. muck mill, 10 puddling furnaces and two heating furnaces.

J. W. Walker, proprietor of the Shiffer, Bridge Works, at Pittsburgh, has recently received a contract for 30 girders aggregating 1,500 tons for use on the Pennsylvania Railroad.

The Rail Market.

Steel Rails.—It is reported that the principal Western mills have reached an understanding by which \$36 at Chicago is made the lowest figure, and the majority of Eastern mills quote \$32 at mill as the lowest. One Eastern mill is now idle for want of orders. Quotations, \$32@33 at Eastern mill.

Old Rails.—Market exceptionally dull. One sale only is reported of 500 tons of double heads, delivered on barge, at \$21.

Scrap.—The market remains quiet. No. 1 American wrought scrap may be quoted at \$20.50@21 from yard.

Track Fastenings.—A meeting of the Spike Association will be held early in the present month. Quotations: Spikes, 2.25@2.40c.; angle bars, 1.95@2c.; bolts and nuts, 3@2.25c.

New York Central Excursion.

The complimentary excursion tendered to press representatives and railroad officers by the New York Central & Hudson River and Wagner Palace Car companies has been postponed from Nov. 30 to Dec. 7. There has been an unavoidable delay in equipping the vestibule train which is to be used to exhibit the steam heating apparatus. The train will leave the Grand Central depot in New York at 10 a. m., arriving in Albany at 1:30 p. m. Returning, the train will leave Albany at 2:30 p. m., arriving in New York at 6 p. m. Luncheon and dinner will be served in the dining car. Both the Martin and the New York Safety systems will be shown.

Achard Electric Brake.

Experiments with the Achard electric brake have been made on the French state railways during the last few years. An improved form has been used, the improvement consisting in the fact that the electric current is not employed directly in working the brake shoes, but is employed to form an electromagnet in a friction apparatus which hangs in a box near the brake axle. The action of the current causes the electromagnet to be attracted by the axle which by friction sets in rotation a drum around which a chain winds. The other end of the chain is attached to the brake lever. The electric current is generated by a dynamo on the locomotive.

Lighting Railway Trains in Germany.

The following statistical data referring to the application of systems of lighting passenger cars on the German railways have been collected by the Imperial Railway Board. The figures are for the whole empire, but do not include the kingdom of Bavaria. Of 19,663 passenger coaches in 1886, 11,938 (60.7 per cent.) were lighted by gas, 5,305 (27 per cent.) with oil, and 2,420 (12.3 per cent.) with kerosene candles. Compared with 1879, gas lighting has increased from 18.4 to 60.7 per cent., while oil lighting decreased from 67.8 per cent. to 27 per cent., and the percentage of candle lighting remained almost stationary. The average cost per light per hour is approximately as follows: .75 cent for gas, 1.12 cents for oil, and .84 cent for candles. The number of cars lit by electricity is not given, but the average cost per light per hour has been found to be .79 cent.

Durability of Steel Rails.

In 1864 a number of Bessemer steel rails were laid on the Orleans Railway of France. In regard to their condition after more than 20 years service, Mr. Caillé reports as follows: Of 675 rails under consideration having a double-headed section, the end and which had been delivered from the works of Imphy and St. Chamond, one-half are on a straight line, the other half on a curve. An average of 30 trains and 8 single locomotives has run over them daily. In October, 1884, two rails picked from those that seemed to have been most worn were taken out, and, together with two others which were taken out in June, 1885, were compared with their original section and submitted to tensile tests and chemical analysis. The decrease in height was nearly equal; the wear at the ends was found to be greater toward the centre, where it was about .08 in. The width of the lower rail head had decreased .04 in. on the St. Chamond rail and .16 in. on the Imphy rail on account of rust, while the upper head of the St. Chamond rail had become .08 in. wider, the upper head of the Imphy rail remaining unchanged in width. Chemical analysis showed that both rails contained the same amount of carbon, and they only differed in the amount of manganese, which was found to be .45 per cent. in the case of the Imphy and .07 per cent. for the St. Chamond. The results of the tests are summed up as follows: Hard as well as soft steel oxidizes but little. Soft steel is not suitable for double-headed rails of the section adopted by the Orleans Railway. The harder the steel the better.

Electric Train Signal.

It is stated that the New York, Lake Erie & Western has decided to adopt an electric train signal in place of the bell rope.

Wooten Locomotives on the Union Pacific.

The Rogers Locomotive Works have nearly completed 10 unusually large Wooten passenger engines for the Union Pacific. The cylinders are 22 x 26, and the drivers 64 in. diameter. These engines are intended for hauling the additional fast passenger trains which are to be put on next week over the steep grades of the mountains between Cheyenne and Ogden. These engines will burn the slack from the Union Pacific coal mines.

Overhead Traveling Cranes.

The propositions for the two large overhead traveling cranes for the new gun shops of the U. S. Navy, Washington, D. C., by the Morgan Engineering Co., Alliance, Ohio, have been accepted, and work will be commenced on them forthwith, one to be completed in 15 months, to have a span of about 62 ft., at a height of about 40 ft. above floor line. This crane will have a capacity to lift guns weighing 125 tons, about 200 ft. travel lengthwise and about 50 ft. crosswise of shops, and will be one of the largest cranes ever built in the world.

Another overhead traveling crane, to be completed in 10 months, for one of the other gun shops, to have a span of about 52 ft., to have a lifting capacity of about 45 tons, to have a travel of about 480 ft. These cranes will cover workshops respectively of about 220 ft. x 62 ft., and 480 ft. x 52 ft., with a lift of about 40 ft. Each of the cranes are so designed to have various speeds of hoist and travel in all directions to suit the varying weights of loads from the lightest to the greatest or maximum loads, the lightest loads being handled in all directions rapidly and the heaviest at speeds to suit the greatest activity such loads could be handled. Automatic stop motions are placed on the various motions that automatically prevent the travel of cranes in any direction beyond their maximum limits, thereby preventing (through neglect or otherwise, on the part of the operator) accidents of any kind through such neglect. The magnitude

of these immense machines can best be appreciated when it is considered that it will take from fifteen to twenty freight cars to ship them. They will make the Navy Department gun shop's facilities for handling work equal to those of any similar shops in the world.

Locomotives in Germany.

Official statistics give the number of locomotives for all Germany, at the close of the fiscal year 1885-86, at 12,450 locomotives, representing a total investment, including tenders, of \$147,000,000, or an average of \$11,818 for each locomotive.

The total is divided as follows:

	Tender engines.	Tank engines.
Passenger.....	440	747
Freight.....	3,737	450
Switching, etc.....	13	4
Total.....	4,190	833
Freight.....	1,384	119
Switching, etc.....	4,508	450
Total.....	5,916	579
Switching, etc.....	4	813
Total.....	118	118
Total.....	932	932
Grand total.....	10,106	2,344

An English Freight Station.

The Midland Railway have just completed a fine example of a freight station on two or more floors, with hydraulic elevators as referred to in a recent issue. The station covers 14 acres and is situated at St. Pancras, London, adjoining the passenger station and hotel.

The screen wall surrounding the station is about 30 ft. high by nearly 3 ft. thick, is nearly 3,250 ft. in length, and is faced with Leicestershire red brick, the inner portion being entirely of hard Staffordshire blue bricks set in cement, no lime being used in any work on the depot. About 8,000,000 bricks have been used. The elevation on Euston road is tastefully ornamented with Mansfield stone and the brilliant Oxfordshire red brick for the "gauged" work in arches and quoins. The openings round the wall are protected by hammered iron screens beautifully worked, of about 11 ft. by 8 ft., and weighing 1,300 lbs. each. At the northern end the arches which carry the rails from the main line to the siding have been fitted up as offices, which are let for about \$250 per annum.

The goods depot is constructed, so to speak, in duplicate. There is a station yard with sidings, platforms, cranes and all necessary accommodation for working the traffic at the level of the streets, and a similar yard constructed about 24 ft. above at a level corresponding with that of the rails of the main line at the north of the passenger station. The upper floor is formed entirely of wrought iron plates and girders weighing over 22,000 tons and supported on more than 460 cast-iron columns 14 ft. 6 in. high and 1 1/2 in. thick. The majority are 30 in. dia., and are spaced 35 ft. apart one way and 33 ft. the other. Each stands on a cast-iron base 54 in. square and 24 in. deep, which rest on 4 ft. of hard brick and 4 ft. of concrete, 12 ft. square, which rests on the London clay.

The main girders are fixed on the caps of the columns. The girders vary in length from 35 to 50 ft. and are 4 ft. deep, and have flanges 2 ft. 4 in. wide. Between them are placed cross-girders 7 ft. apart and 2 ft. 6 in. deep; these are carried on stools which raise them clear of the bottom flange of the main girders, except in one part, where a number of turn tables are to be fixed in the upper yard. Here the cross-girders stand directly on the lower flange of the main girder to provide sufficient depth between themselves and the rail level to admit the turn tables. The floor is composed of curved plates 6 ft. 2 in. by 3 ft. by 3/4 in., riveted to the underside of the flanges of the cross girders. At the lowest part of the curve, midway between the girders, ferrules are inserted in the plates to deliver the surface water into gutters below. These gutters deliver at intervals into vertical conduits which are connected to drain pipes below ground.

The traffic on the ground floor is carried on by lowering the cars from the upper floor by means of powerful hydraulic hoists worked by engines and accumulators. The cars are sorted and shunted to the different platforms as on the upper floor, by locomotives, which also are transferred from one level to the other by means of the hydraulic lifts. On the sides of the depot facing Euston road and Midland road capacious stores for vegetable, and particularly potato traffic, have been provided. The approach to these stores is by means of private roads parallel to the streets. These roads are covered in with glass roofs. At the back of each store and forming part of it is a large platform with siding accommodation. Altogether several thousand wagons can be accommodated. The whole of the lower yard, consisting of about 14 acres, is paved with granite up to and between the rails, so that carts and vans can have access to any part of it. The upper yard is approached by two easy inclined cartways with stables beneath. On this floor is the general goods shed, 800 ft. long and 150 ft. wide, a lofty warehouse 300 ft. by 100 ft., four stories high, and a large covered station for the milk and fish traffic. Large accommodation is also provided for coal.

The works have been designed and carried out by Mr. J. A. Macdonald, M. I. C. E., under Mr. John Underwood, the chief constructive engineer to the company.

American and English Locomotives.

A person writing over the initials J. C. M. from France to *Engineering* holds that a good test of the relative merits of the locomotives of different countries may be deduced from the following data: In Brazil English locomotives are used on the majority of roads built and managed by Englishmen, but American locomotives are used on the great government road known as the Dom Pedro Segundo line after a trial of English locomotives; and they are used on the Southern Brazilian Rio Grande do Sul, built with English capital and owned by an English company. They are also being introduced on the Porto Alegre & Uruguaiana Railway, a government line, where they are supplanting the Belgian locomotives first adopted. On the Mexican Railway, Fairlie English engines are used on the grades of 211 ft. per mile. American locomotives on grades of 164 to 158 feet per mile, while the English locomotive is relegated to the comparatively easy portion of the line. The writer in question adds that the introduction of American locomotives on railroads made and worked by the natives of any country, and more especially their introduction on railroads made and worked by English companies, is a matter for very serious reflection, for it must be borne in mind that wages are higher, materials of construction dearer and facilities of shipment are less in the United States than in England.

A question asked as to the kind of locomotive used on the Grand Trunk of Canada seems pertinent to this inquiry. This road and the Great Western of Canada have for the last 13 years built all their locomotives at their own shops, and while the general design and arrangement is American, many details, such as the Ramsbottom safety valve and the position of the driving springs beneath the boxes, have been

adopted from English practice. A combination of the bar and plate frame is also used. The Canadian Pacific now build all their locomotives, which more closely follow American models.

English locomotive builders, however, export a large number of locomotives to foreign countries in all parts of the world, including France, Italy, Spain, Holland, Denmark, Sweden, Norway, Java, Argentine Republic, Chili, etc.

A Novel Use for an Old Tunnel.

The Scotland street tunnel, Edinburgh, which has been disused for 20 years, has been leased to a Mushroom Co., who have converted it into a huge mushroom-growing bed. The tunnel is 1,109 yards long and 24 ft. wide, and when fully occupied 2,000 tons of manure and soil will have been deposited. At present mushrooms at all stages are growing, in some places as many as 82 plants growing in a square foot. A uniform temperature is maintained in the tunnel, and the great advantage is that they can be grown summer and winter and supplied fresh every morning to consumers.

Test of the Emerson System of Heating.

The Emerson system of continuous heating was recently tested at Bellows Falls, Vt., before the Vermont Railroad Commissioners. Among those present were Mr. I. G. Smith, President, and Mr. I. W. Hobart, director, of the Central Vermont, and Mr. Ray (Connecticut River). The trial went to show that the car could be kept warm by the auxiliary or reserve stove and boiler intended to be used only when the engine is detached. A fire was lit in this stove underneath the car, and the results of a trip from Springfield to White River Junction and back are given below, it being understood that the heating apparatus was not connected with the engine. Distance traveled 248 miles, coal used 35 lbs., temperature in the car 70 to 71 deg., pressure of steam, 2 to 20 lbs. per square inch. The draft of the fire can be regulated from inside the car. The result appears to show that cars can be kept warm when steam from the engine is not available, but the test would have been more convincing had the outside temperature been lower, for though the day was cold, it was a long way above zero.

Continuous Heating on the Chicago, Milwaukee & St. Paul.

Several experiments on heating passenger cars with steam from the engine were made on the Chicago, Milwaukee & St. Paul last spring. The tests were satisfactory, but the weather became so warm that it could not be demonstrated whether it would be successful at an extreme low temperature. The trial was renewed on the night of Nov. 27, the thermometer standing at 28 degrees below zero, and the train was run between St. Paul and Chicago, heated only by steam conveyed from the engine. A temperature of 80 degrees was maintained in the cars with the ventilators open. The engineer could not discover any sensible loss of steam or power, and the result was considered very satisfactory. The principle of continuous heating having passed beyond the limits of an experiment, the system has been permanently adopted, and will be applied to all trains running between Chicago and Minneapolis on the Chicago, Milwaukee & St. Paul.

In addition to the heating, provision has been made for the proper ventilation of cars with "indirect heating radiators," so that the motion of the train forces a current of freshly-heated air into the car.

The system used was devised by the company's mechanical engineer, Mr. Geo. A. Gibbs.

Steam Heating on the Central of New Jersey.

It is announced that the Central of New Jersey has already in service a train on the Newark and New York branch fitted with the Gold system, and that other trains will be fitted as quickly as possible.

A Lilliputian Locomotive.

A very small locomotive has lately left the shops of Kraus & Co., of Munich. This engine, together with a car and one mile of portable track, is intended as a present from the King of Belgium to the Sultan of Morocco. This imperial toy will be laid in the gardens of the palace. The different pieces having necessarily to be carried from the port of landing to the capital by the primitive mode of freight transportation—the pack saddle—lightness of the single pieces was the chief consideration with the builders. The gauge is 23 3/4 in. The heaviest parts of the engine, the boiler and the lower frame, weigh about 660 lbs. each. The power the engine can develop is 4 H. P., and the speed is 9 miles per hour. It is a 4-wheeled tender locomotive on the Kraus system with water tank frame. To save weight without reducing the strength of the single parts, phosphor bronze and steel have been freely used in its construction. The cylinder, piston, crosshead and journals are of phosphor bronze. The firing having to be done with wood a relatively large grate surface (3/4 of the total heating surface) has been given, and the engine has been provided with an American spark arrester. The dimensions are:

Cylinders.....	3 3/4 in. x 6 1/4 in.
Drivers, diameter.....	15 1/4 in.
Wheel base.....	27 1/4 in.
Heating surface.....	10.7 sq. ft.
Grate area.....	.75 sq. ft.
Boiler pressure.....	180 lbs.
Tank capacity.....	50 gallons.
Weight empty.....	2,420 lbs.
Weight in working order.....	3,080 lbs.

This is probably one of the smallest locomotives ever made, though many engines are working regularly on a narrower gauge, 18 in., in shops, steel works, brick yards, etc.

Aluminium.

A process of obtaining aluminium from its ores or from aluminiferous earth, or earths containing alumina, and of combining aluminium with other metals, is described in a patent specification of W. A. Baldwin. A mixture of four parts of clay, one part of charcoal, and three parts of sodium chloride fused in a suitable pot, yields a light alloy of aluminium and sodium, to be skimmed off and re-melted in a fresh crucible under a cover of sodium or sodium chloride. When melted, the contents of the second vessel are poured into a heated mould, wherein the heavier aluminium subsides. Or by introducing other metals, useful alloys are formed without fusion, by the simple permeation of the alloying metal by the aluminium.

An Automatic Whistle.

Some experiments have been made on the Pennsylvania with an automatic whistle, the object of which is to give the signal at grade crossings, whether the engineer is on the alert or not. The device is simple, consisting of a bar or lever connecting with the whistle and extending down to within an inch of the track. At a point six hundred yards from the crossing a projection is placed which, striking against the lever, starts the whistle. Even if the engineer is asleep, the warning is thus fully given.

Bamboo Waste.

An exchange states that the Philadelphia & Reading lately tried an experiment on one of its passenger trains on the Lebanon Valley with "bamboo" waste. When the train arrived at Annville, on its way to Reading, four of the

journals were red hot and it took 15 minutes to cool them off. On arriving at Lebanon it took 20 minutes to repeat the cooling process. The train arrived in Reading 30 minutes late and all the connections were knocked out just that much. The stuff, it is said was put into the boxes and oil poured over it, and when the car inspectors examined them at Lebanon there was nothing in them, the "bamboo" having all been burned out.

A Medical Use of Train Telegraphy.

A few days since on Lehigh Valley train No. 12 a lady passenger became suddenly and seriously ill when the train was about 15 minutes west from Perth. At 4:53 p. m. the train operator dispatched a message to Dr. Shannon, of Flemington, who met the train at the Junction at 5:14 and administered to the patient while the train bowed along to Easton. The train telegraph was also used successfully in providing a carriage for the sick lady on her arrival, and a locomotive to convey the doctor back to his home.

Electric Hand Lantern.

A German patent has been granted to A. Friedlander for an electric hand lantern. This consists of a box of hard rubber carrying a small three-candle-power incandescent light, together with a reflector and glass protector. The elements in the box, carbon and zinc, produce the current necessary to feed the light. The box is divided into five compartments holding the liquid, and the electrodes are placed in such position that no decomposition occurs when the lantern is not in use. The circuit is closed when the electrodes are dipped in the liquid; the current is stronger and the light brighter if the electrodes are dipped deeper in the liquid; this depth and consequently the brightness of the light can be regulated by means of a button on the outside. The liquid is a combined solution of chloride of zinc, bichromate of soda in water and acid, and the lantern can hold a sufficient supply of this solution to last for about three hours.

Train Electric Lighting in Europe.

There are some trains lighted by electricity running on the London, Brighton & South Coast Railway, and two trains on the Great Northern. The Stroude-Houghton system is used, the light being fed by secondary batteries, and the batteries charged by dynamo driven from the wheels of one car. The light throughout the train is dependent upon continuity with the batteries in this car.

The *Electrical Review*, in criticising this arrangement, says:

Each coach must, of necessity, carry its own lighting power, so that when uncoupled for any purpose it may have within itself lighting power for a given time.

The Main-Neckar Railroad has also a train running between Frankfurt and Heidelberg, lighted by electricity, on the Khokusky system.

Locomotive Building in Scotland.

The Scotch locomotive builders are busy, Neilson & Co., of Glasgow, having lately received a repeat order for 30 locomotives for an Indian line, while the Clyde Locomotive Works have received an order from South America for 84 locomotives.

Working Switches from a Moving Train.

A patent has recently been granted to Mr. A. S. Wormer, of Holland, N. Y., for enabling switches to be operated by a moving train, in order to avoid the delay caused by trains stopping to open and close the switches of side tracks. Hinged bars placed in the track at a convenient distance from the switch to be operated are connected to the switch, and are operated when struck by a movable spring plunger on the engine.

A similar switch, invented by Mr. N. E. Springstein, of Royal Oak, Mich., was tried on the Detroit, Grand Haven & Milwaukee at Pontiac lately. The weight of an advancing engine acts on levers which shift the switch.

Devices of this kind have been offered before, but seem not to be appreciated by the railroad public enough to come into actual use.

The Siberian Railroad.

Russian government engineers have commenced making surveys for a railroad across Siberia. It has been decided that the line shall be as direct as possible, and only touch the centres of trade in Siberia, the main object being to connect Siberian and European Russia, particularly in case of war. The route proposed starts from Zemtsov, in the Ural Mountains, and thence runs through the Ishem Government, Omsk, Tomsk, along the north shore of Lake Baikal, the upper River Ura, the Amoor gold fields, River Zay, Bureia, the Ussuri Valley, and thence to Vladivostok, the Russian naval port in the North Pacific. The line will be about 4,000 miles long. The Russian Government proposes to carry out this gigantic undertaking entirely with Russian money. The line is estimated to take about five years in building, and the entire cost is put down at 800,000,000 roubles, or about \$350,000,000. There will be five gigantic bridges along the route, the total cost of which is alone estimated at \$35,000,000. The sudden impetus given to this new line of railway is caused by the Canadian Pacific Railway, which has given England an immense superiority over Russia in the North Pacific in case of war. Within a few years Russia will also be in direct communication with the Atlantic Ocean, via Finland, Sweden and Norway. This line will be a convenient outlet for trade, as the western terminus, the port of Lofoden, is never frozen in the winter, when all the Russian ports on the Baltic and White Sea are closed for several months. Lofoden will not, however, be available for military purposes, as it is situated in Norwegian territory.

General Railroad News.

MEETINGS AND ANNOUNCEMENTS.

Meetings of the stockholders of railroad companies will be held as follows:
Boston & Albany, annual meeting, Boston, Dec. 14.
Fort Worth & Denver City, annual meeting, at the office, Fort Worth, Tex., Dec. 13.
Housatonic, annual meeting, at the office, Bridgeport, Conn., Dec. 16.
Lehigh & Hudson River, annual meeting, at the office, New York, Dec. 5.
Pittsburgh & Connellsville, annual meeting, Monongahela, House, Pittsburgh, Dec. 5.

Railroad and Technical Conventions.

Meetings and conventions of railroad associations and technical societies will be held as follows:
The Western Society of Engineers holds its regular meetings at its hall, No. 15 Washington street, Chicago, at 7:30 p. m., on the first Tuesday of each month.
The New England Railway Club meets at its rooms in the Boston & Albany passenger station, Boston, on the second Wednesday of each month.
The Boston Society of Civil Engineers holds its regular monthly meetings at its rooms in the Boston & Albany station, Boston, at 7:30 p. m. on the third Wednesday of each month.

The New York Railroad Club meets at its rooms, 113 Liberty street, New York City, on the third Thursday of each month.

The Western Railway Club meets in Chicago the third Wednesday in each month.

The American Society of Mechanical Engineers, eighth annual meeting, Philadelphia, Pa., Nov. 28 to Dec. 2, at the Continental Hotel.

The American Society of Civil Engineers meets at its rooms, 127 East Twenty-third street, New York, the first and third Wednesday of each month.

The Engineers' Club of St. Louis meets the first and third Wednesday of each month till June.

The Central Railway Club meets at the Tiff House, Buffalo, the fourth Wednesday of January, March, May, August and October.

Dividends.

Dividends on the capital stocks of railroad companies have been declared as follows:

Chicago & Northwestern, semi-annual, 3 per cent. on common and quarterly, 1 1/2 per cent. on preferred, payable Dec. 24.

Chicago & Indiana Coal, quarterly, 1 1/2 per cent., payable Dec. 5.

Cincinnati, Indianapolis, St. Louis & Chicago, 1 1/2 per cent., payable Dec. 15, to stockholders Dec. 1.

Connecticut River, quarterly, 2 per cent., payable Jan. 2.

Delaware & Hudson Canal, quarterly, 1 1/4 per cent., payable Dec. 15.

Eastern, 4 1/2 per cent., payable Dec. 15, to stockholders of record Dec. 3.

The Adoption of Uniform Couplings for Continuous Heating.

By mutual agreement representatives from certain railroads met at the Astor House, in New York, on Tuesday, Nov. 15, for the purpose of considering the various forms of couplers for steam heating pipes of passenger cars. The following parties were present, representing the railroads as named: H. Stanley Goodwin and John I. Kinsey, Lehigh Valley; G. W. Cushing, Philadelphia & Reading; A. S. Vogt, Pennsylvania; F. D. Casanave, Pittsburgh, Fort Wayne & Chicago; E. B. Wall, Pittsburgh, Cincinnati & St. Louis; Jno. W. Cloud and J. E. Sague, New York, Lake Erie & Western; R. C. Blackall, Delaware & Hudson; G. H. Griggs, Central of New Jersey; Wm. Lewis and Mr. Smith, Delaware, Lackawanna & Western.

The meeting was rather informal, and had no organization, but the question of one or two train pipes was carefully discussed, and also the question as to how to obtain the desired flexibility of couplings, whether with rubber hose or with metallic couplings, and the following resolution was finally passed:

"Resolved, That no railroad here represented will adopt a steam heater train coupling without first submitting it to a committee of five, to be appointed by the chair. This committee will be a standing committee, and it will be their special duty to inquire into all forms of coupling for train heating."

The following parties were named on this committee: Messrs. Cushing, Goodwin, Vogt, Cloud and Blackall.

It was also decided to have the resolution above given printed in the railroad papers, together with the names of the railroads represented at the meeting, and that other railroad companies be requested to co-operate, if they so desired, and to communicate with this committee in regard to any couplers which they may consider it desirable to adopt, with a view of establishing the best coupler as a uniform coupler on all railroads if possible.

The meeting adjourned to meet again at the call of the Committee, and when such call is made it will be through the railroad papers, and it is hoped that other railroads not represented at this meeting will send representatives to such meeting when it is called, so as to get as large a representation as possible to discuss this very important question.

PERSONAL.

—Elijah Smith has resigned the presidency of the Oregon & Transcontinental.

—Isaiah S. Emery has resigned as General Passenger Agent of the Buffalo, Rochester & Pittsburgh.

—General Manager W. H. Barnes of the Boston & Albany, sailed, with his wife, for Europe, Nov. 30.

—James T. Gardner has resigned the position of General Superintendent of the Buffalo, Rochester & Pittsburgh.

—George F. Walker, Superintendent of the Southwestern Division of the Chicago, Rock Island & Pacific, has resigned.

—Byron S. Fitch, General Traffic Manager of the Colorado Midland, died in Denver, Col., last week. He was 45 years of age and a native of Cooperstown, N. Y.

—David H. Winton has resigned the position of Assistant Superintendent of the Kansas City, St. Joseph and Council Bluffs and the Hannibal and St. Joseph roads.

—A. M. Tucker has resigned the Superintendency of the Susquehanna Division of the New York, Lake Erie & Western. He will enter the banking business in Elkhart, Ind.

—J. J. Casey has resigned the position of Master Car-Builder of the Louisville, New Orleans & Texas to become Superintendent and General Manager of the Missouri Car & Foundry Works in St. Louis.

—Thomas Jessop, Chairman of the firm of William Jessop & Sons, Limited, of Sheffield, Eng., and of the United States, died this week at the age of 83. He had been largely interested all his life in the manufacture of crucible steel, and was known as the "Steel King."

ELECTIONS AND APPOINTMENTS.

Atchison, Topeka & Santa Fe.—George Eddy has been appointed General Passenger Agent for the Colorado Division with headquarters in Denver.

Broadway, Berkeley & Piedmont.—The incorporators of this Oakland, Cal., company are: Walter Blair, Samuel Howe, Montgomery Howe, W. B. Morse, Henry Vrooman.

Chicago, Milwaukee & St. Paul.—James G. Everest has been appointed General Traveling Passenger Agent, with headquarters at Chicago. D. C. Brady has been appointed Southern Passenger Agent, office at Louisville, Ky.

Chicago, Santa Fe & California.—The office of A. H. Crocker, Superintendent of the Chicago Division, will be at the Dearborn Station, Chicago, from Dec. 1.

Cincinnati, Indianapolis, St. Louis & Chicago.—A. M. Stinson has been appointed Division Freight Agent, with headquarters at Lafayette, Ind.

East Tennessee, Virginia & Georgia.—The old officers were re-elected this week, as follows: President, Gen. Sam-

uel Thomas; Vice Presidents, Calvin S. Brice and Henry Pink; Secretary, L. M. Schwan; Treasurer, J. G. Mitchell.

Fresno City, Belmont & Yosemite.—The directors of this California company are E. C. Winchell, Wm. R. Thomas, A. M. Drew, C. Chisholm and H. P. Hodges, Fresno City; T. C. White, Central Colony, and J. P. Vincent, Big Dry Creek.

Hannibal & St. Joseph.—E. G. Fish has been appointed Assistant General Superintendent of this and the Kansas City, St. Joseph & Council Bluffs road; office at Kansas City, Mo.

Isbell & Iron Mountain.—The incorporators of this Alabama company are Jno. E. Isbell, of Franklin County; Wm. H. Nance and Geo. C. Almon, of Russellville; William I. Bullock, of Franklin County; Lang C. Allen, of Florence; Jas. T. Kirk and Ed. B. Almon, of Tusculumbia.

Kansas City, Fort Scott & Gulf.—J. R. Hardy has been made Superintendent.

Kansas City & Memphis.—The incorporators of this Arkansas company are: George H. Nettleton, Wallace Pratt, Jacob Erb, Wm. Vance, Jr., and J. F. Smith.

Lehigh Valley.—Walter G. Berg has been appointed Principal Assistant Engineer and will take charge of the Eastern terminal work of the company.

Louisville, New Albany & Chicago.—A. C. Tully has been appointed Contracting Agent, with headquarters in Cincinnati, O.

Louisville, New Orleans & Texas.—Patrick Long has been appointed Master Car-Builder, office at Vicksburg, Miss., vice J. J. Casey, resigned.

Missouri Pacific.—L. E. Chaloner has been appointed New England Traveling Agent, with territory extending over New Brunswick, Nova Scotia, Prince Edward Island and that portion of Quebec south of the St. Lawrence River.

New York Central & Hudson River.—Frank J. Wolfe has been appointed General Baggage Agent, vice R. F. Westcott, resigned.

New York, Lake Erie & Western.—At the annual meeting this week the old board of directors was re-elected as follows: John King, John G. McCullough, Ogden Mills, J. Lowler Welsh, William Whitewright, William A. Wheelock, Henry H. Cook, George W. Quintard, William Libbey, Cortlandt Parker, Morris K. Jesup, James J. Goodwin, William B. Dinsmore, William L. Strong, William N. Gilchrist, Josiah Belden and Joseph Ogden.

George E. Allen has been appointed General Northern Passenger Agent, with headquarters at Buffalo, N. Y., vice W. C. Rinearson, who resigned some time ago.

New York, Pennsylvania & Ohio.—The official announcement of the appointment of W. C. Rinearson to the position of Assistant General Passenger Agent, with headquarters at Cincinnati, O., was made this week.

Cairo & Northwestern.—C. O. Patier has been elected President and Henry Wells Secretary and Treasurer.

Oregon & Transcontinental.—Sidney Dillon has been elected President.

Richmond & Petersburg.—F. R. Scott was this week re-elected President with all the old directors.

Richmond & West Point Terminal.—The following ticket has been agreed upon for presentation at the election on Dec. 13: John H. Inman, R. T. Wilson, Cornelius N. Bliss, William Rockefeller, Roswell P. Flower, George S. Scott, John G. Moore, John H. Hall, T. M. Logan, Calvin S. Brice, Samuel Thomas, C. M. McGhee, George F. Stone, J. A. Rutherford, James B. Pace, E. Lehman and Alfred Sully.

Rome & Decatur.—Judge R. T. Dorsey, of Atlanta, Ga., was last week appointed General Receiver of this road.

St. Louis, Arkansas & Texas.—J. M. S. White has been appointed General Agent of the company with headquarters at Kansas City, Mo., vice J. M. Bullock, resigned.

Seattle & Eastern Construction Co.—The incorporators of this Washington Territory company are: Thomas Burke, Angus McIntosh and Daniel H. Gilman, of Seattle, and Franklin M. Jones and William H. Scott, of New York.

Sea View.—At the meeting in Flatbush, N. Y., last week, the following directors and officers were elected: Directors, I. M. Bon, Felix Campbell, Morris Hirsch, Jesse Johnson, A. R. Johnson, James Jourdan, E. L. Langford, H. C. Mangles, J. L. Morrow, Wm. Richardson, F. A. Schroeder, Alonzo Slote and D. H. Valentine, all of Brooklyn, N. Y.; F. A. Schroeder, President; I. M. Bon, Treasurer; J. L. Morrow, Secretary and Superintendent.

South & North Alabama.—The directors have elected the following officers: H. F. D. Bardelaben, President; M. H. Smith, Vice-President; H. M. Bush, Secretary and Treasurer.

Springfield, Streator & Chicago.—The incorporators of this Illinois company are: Thomas Hamer, of Vermont, Ill.; N. L. Williams and L. A. Williams, of Syracuse, N. Y.; Robert W. Gere, of Lincoln, Ill., and Ray Hamer, of Vermont, Ill.

Tucson & Globe Northern.—The new directors elected last week at Tucson, Ariz., are W. C. Culver, C. F. Walker, George Pusch, J. C. Handy, L. C. Hughes, C. C. Stephens, A. Steinfeld, W. C. Davis, Samuel Hughes, John Zelwiger and S. M. Franklin. The officers elected are: President, W. C. Culver; Vice-President, J. C. Handy; Treasurer, George Pusch; Chief Engineer, C. F. Walker.

West Virginia, Kentucky & Tennessee.—A. B. Stone has been elected President.

Wisconsin Central.—A. A. Allen has been appointed General Superintendent. The position of Assistant General Manager has been abolished.

F. W. Fratt has been appointed Chief Engineer.

OLD AND NEW ROADS.

Atchison, Topeka & Santa Fe.—A preliminary survey is being made for a line from Gallup, N. M., a coal mining town on the Atlantic & Pacific, to Durango, Col., 125 miles north.

Augusta & Chattanooga.—W. B. Lowe & Co., contractors, have stopped work on this Georgia road and are suing the company for \$30,000 due them.

Bellaire, Zanesville & Cincinnati.—The stockholders of this road, now in the hands of a receiver, are to be assessed 33½ per cent, in order to clear off the old debts of the company for which they are responsible.

Broadway, Berkeley & Piedmont.—Articles of incorporation filed in Oakland, Cal., for the purpose of build-

ing 8 miles of road in and around that city. Capital stock, \$500,000.

Cairo & Northwestern.—A preliminary survey is to be made at once for this line, which is projected to run from Cairo, Ill., to a point on the Mississippi River opposite Cape Girardeau, about 32 miles. It will connect with the Cape Girardeau & Northwestern.

Canadian Pacific.—Track was laid to Sault Ste. Marie, Ont., on Nov. 29, and the road will be ready for trains on Dec. 15. The seventh span of the International Bridge across the Sault was begun this week.

Central Vermont.—It is rumored that this company has bought the Sullivan County road of the Connecticut River Company for \$1,000,000.

Chicago, Milwaukee & St. Paul.—The new line to Kansas City was opened for freight traffic this week. Passenger traffic will not begin for some time yet. The new line runs from Chicago to Kansas City via Marion, Cedar Rapids and Ottumwa, Ia., and Chillicothe, Mo.

Chicago & Northwestern.—The company will extend its track to Delavan, Wis.

Cincinnati, Hamilton & Dayton.—It is assuredly stated by a Cincinnati newspaper that movements are in progress which will shortly result in placing Henry S. Ives & Co. in control of this road again.

Columbia, Newberry & Laurens.—Twenty-one miles of this road are graded from Columbia, S. C. C. D. Langhorne, of Richmond, Va., has the contract for the masonry on the bridge over the Broad River at Columbia. Contract for grading 18 miles of road near Prosperity, S. C., will soon be let. H. C. Mosely, of Prosperity, is President of the company.

Columbus Southern.—It is authoritatively stated that work will begin at once on this road, and be completed in a year. The line is to extend from Columbus, Ga., to Albany, and thence to Brunswick.

Columbus & Western.—The extension of this road has been completed to Sylacauga, Ala., and trains are now running to that point from Columbus, Ga. The road connects with the Atlanta & Anniston at Atlanta.

Detroit, Lansing & Northern.—The company proposes building a branch from Lansing to Ithaca, Mich., via St. Johns and Maple Rapids.

Fitchburg.—A suit has been begun by the state of Massachusetts against the Troy & Boston Co. as defendant and the Fitchburg as trustee. When the Southern Vermont Railroad Co. leased the Troy & Greenfield road to the Troy & Boston it was to receive an annual rental of \$12,000. When the commonwealth acquired the Southern Vermont Railroad, of course, the rental was to be paid to the state of Massachusetts. The money was paid up to 1884, when the officials of the leased road stated that there were offset claims against the commonwealth, and therefore declined to pay further rental. These claims were investigated by the governor and council, and were decided to be of no value, and the state treasurer was instructed to collect the rental. This was not done at the time, but A. W. Beard, the present treasurer has now begun the proceedings as noted. The amount due the state is about \$50,000.

Flint & Pere Marquette.—The court has granted an injunction to some of the common stockholders to prevent the purchase of Port Huron & Northwestern road, made last week.

Fremont, Elkhorn & Missouri Valley.—The extension of the Dakota line of this road has been opened for traffic from Rapid City, Dak., to Whitewood, 584 miles from Missouri Valley, and 1,051 miles from Chicago.

Fresno City, Belmont & Yosemite.—The company has been incorporated in California with a capital stock of \$500,000.

Georgia Southern & Florida.—Work was begun on this road at Macon, Ga., on Nov. 25. The line will be built direct to Valdosta, Ga., 150 miles.

Grand Trunk.—It is reported that this company will control and operate the Northern Railroad of Canada after Feb. 1.

The engineers have the line located to Sault Ste. Marie, Mich., and work will soon begin.

Gulf, Colorado & Santa Fe.—The company will build its Farmersville & Fort Worth line, and will probably build other extensions in 1888.

Helena, Boulder Valley & Butte.—The road has been extended from Boulder to Calvin, Mont., 18 miles.

Illinois Central.—The company has arranged to buy nearly all the stock of the Dunleith and Dubuque Railroad Bridge. The capital stock of the bridge company is \$1,200,000, of which \$682,000 was held in Dubuque, \$335,000 by the Illinois Central, and the rest by Eastern capitalists. The Illinois Central will buy the \$682,000. The transaction will probably be concluded at the next meeting of the Illinois Central stockholders.

The company expects to build a branch road from Crystal Springs to Vicksburg, Miss.

Indianapolis, Decatur & Springfield.—The reorganization of the company is almost completed, and it is stated that the Receiver will be discharged within 60 days.

Intercolonial.—The branch between Picton, N. S., and New Glasgow was opened for business on Nov. 29. Up to this time the towns have depended on ferryboat connection.

Isbell & Iron Mountain.—Articles of incorporation filed in Alabama. The proposed road is to be built from Isbell, Franklin County, to a point on the Sheffield & Birmingham road near Russellville, thence along Hamilton Creek.

Johnsonburg.—The company has been incorporated in Pennsylvania to build a road in Elk and McKean counties, 42 miles long. It will be a connecting link for the Buffalo Rochester & Pittsburgh.

Kanawha & Ohio.—It is said to be one of the possibilities that a road will soon be built from Charleston, W. Va., the eastern terminus of this road, to Clifton Forge, Va., the western terminus of the Richmond & Allegheny, a distance of about 200 miles.

Kansas City & Memphis.—Articles of incorporation filed in Arkansas with the purpose of building a road from Marion, in Cleburne County, to a point on the Mississippi River opposite Memphis, Tenn. Capital stock, \$2,500,000.

Kansas City, Rich Hill & Southern.—A 5 per cent. assessment has been made on the stockholders of this company. The right of way will be secured at once and work begun. The line is projected to run from Kansas City to Rich Hill, Mo.

Kansas City, Texarkana & Gulf.—The road is located to Antimony City, 60 miles north of Texarkana, Ark., and contracts for building that section will now be let.

Kansas City, Wyandotte & Northwestern.—The road was completed to Seneca, Kan., from Kansas City, Mo., on Dec. 1. Trains will be running in a few days.

Lake Erie & Western.—The general offices of this company will be changed from Bloomington, Ill., to Indianapolis, Ind., on Dec. 3.

Louisville Southern.—It is reported that Mason, Gooche & Hoge have received the contracts to lay the track from Louisville to Harrodsburg, Ky.

Manchester & Lawrence.—The special meeting held at Manchester, N. H., this week for the purpose of acting upon the proposed lease of the line to the Boston & Maine, was adjourned without action until the day of the annual meeting. There is not likely to be any opposition to the lease.

Mexican Central.—It is reported that the company has ordered a survey made for a line to extend from Lampasas, Mex., to Monclova, where the greatest coal fields in Mexico are situated.

On the branch from Irapuato to Guadalajara track is laid to La Piedad, 59 miles, and traffic will shortly be begun to the latter point.

Minneapolis, Sault Ste. Marie & Atlantic.—It is hoped to have the road finished to Sault Ste. Marie, Mich., within a few days. With this accomplished and the International Bridge over the Sault completed the through connection from Minneapolis Minn., to Boston will be effected.

A survey is to be made at once for the spur to Florence, Wis., 25 miles.

Missouri Pacific.—The extension to Marshall, Mo., ought to be finished during the present month. It is stated that upon completion of the line a train will be put on between Kansas City and Marshall.

Mobile & Dauphin Island.—work on this road was stopped in September. It is stated that all the bills against the company will be paid and construction work resumed at an early date.

New Orleans, Mexia, Cleburne & Northwestern.—The company has been formed to build a road from Cleburne, Tex., via Hubbard City and Mexia to New Orleans, La. Capital stock, \$1,400,000. Col. Chambers, of Mexia, Tex., is a member of the company.

New Roads.—A company has been formed in New Germantown, N. J., to build a road from White House Station to Pottersville, to connect with the Central of New Jersey. The directors are: James N. Fidecock, A. A. Clark, John Lane, John E. Melick, W. W. Sutton, H. S. Potter and H. C. Hoffman. Robert Craig, Treasurer; J. R. Fisher, Secretary; A. A. Clark will be the Counselor, and J. E. Melick, of Springfield, Ill., the Engineer and Superintendent. Enough has been subscribed to guarantee the building of the road. Surveying starts immediately.

A company has formed to build a road from Lake Beresford on the St. John's River to De Land, Fla., with a branch to Lake Helen. J. B. Stetson, of De Land, is interested.

The stockholders of the Simi Land & Water Co., of Los Angeles, Cal., are arranging to build a 15 mile road from that city to the coast and have voted a cash subsidy of \$100,000 to the project. It is hoped to begin work within 90 days.

New York, Boston & Montreal.—On Dec. 6 two suits, involving over \$6,000,000, will come up in the United States Circuit Court in New York. One has been on the docket since 1875, and the other since 1878. The first is that of the Banque Franco-Egyptienne, of Paris, against John Crosby Brown and others, and the second is that of Henry L. Bischoffsheim, of London, against John Crosby Brown and others. The New York, Boston & Montreal Co. was organized in February, 1873, and among its earliest acts was the issuance of \$12,250,000 first-mortgage bonds and \$12,750,000 of second-mortgage bonds, besides \$15,000,000 of common stock. Of the former bonds \$6,250,000 were placed in the hands of Bischoffsheim & Goldschmidt, of London, of which they transferred \$5,000,000 to the Banque Franco-Egyptienne. The remaining \$1,250,000 was retained by the London bankers, and is the basis of their suit. The complaint sets forth that the railroad company put forth delusive and exaggerated pretenses about the earning capacity of the road, if completed, and alleges that the \$1,250,000 of bonds were utterly worthless as security for the loan that was made.

New York Central & Hudson River.—It is stated that the work of double tracking the road between Rochester and Suspension Bridge will soon be commenced and pushed so as to be completed early in the spring. The line is already double tracked between Brockport and Rochester, and there are long stretches of double track at other points, so that half the distance is now covered. The Charlotte branch, extending from Rochester Junction to Charlotte, N. Y., is to be double tracked before next summer. About 4½ miles of new track will be required.

The earnings and expenses of this company for the quarter ending Sept. 30, and for the year to Sept. 30, is as follows:

Three months to Sept. 30:		1887.	1886.	Inc. or Dec.	P. c.
Gross earnings.....	\$9,550,074	\$8,717,147	I.	\$832,927	9.5
Operating expenses.....	6,061,068	4,877,675	I.	1,183,393	24.3
P. c. expenses.....	63.48	55.95	I.	7.53	13.4
Net earnings.....	\$1,487,938	\$3,839,472	D.	\$2,351,534	157.4
First charges.....	1,889,324	1,926,886	D.	37,562	1.9
Profit.....	\$1,597,682	\$1,912,586	D.	\$314,904	19.7
Dividends (01 p. c.).....	894,283	894,283			
Surplus.....	\$703,399	\$1,018,303	D.	\$314,904	30.9
Year to Sept. 30:					
Gross earnings.....	\$35,267,036	\$30,506,361	I.	\$4,760,675	15.7
Operating expenses.....	22,388,623	18,610,377	I.	3,778,247	20.3
P. c. expenses.....	63.43	61.00	I.	2.43	3.9
Net earnings.....	\$12,908,432	\$11,895,984	I.	\$1,012,448	8.5
First charges.....	7,700,924	7,245,886	I.	455,038	6.3
Profit.....	\$5,147,508	\$4,650,098	I.	\$497,410	10.6
Dividend (4 p. c.).....	3,577,132	3,577,132			
Surplus.....	\$1,570,376	\$1,072,966	I.	\$497,410	46.3

New York, Lake Erie & Western.—The statement of this company for October is as follows:

Month of October:		1887.	1886.	Inc.	P. c.
Gross earnings.....	\$2,550,008	\$2,440,704	I.	\$109,305	4.4
Operating expenses.....	1,528,110	1,457,046	I.	71,064	4.8
Net earnings.....	\$1,021,898	\$983,657	I.	\$38,241	3.8
Due leased lines.....	240,783	205,814	I.	34,969	17.9
Net earnings.....	\$781,115	\$777,843	I.	\$3,272	0.4

At the meeting this week, the amendments to the lease of

The traffic was as follows:

	1887.	1886.	Inc. or Dec.	P. c.
Passengers carried	6,865,903	6,261,118	I.	604,785 9.6
one mile	188,167.422	183,204.462	I.	4,962,960 2.6
Tons freight carried	13,649,260	12,806,918	I.	1,142,342 8.9
one mile	2,183,734.855	2,058,394.022	I.	125,340,833 6.0
Averages:				
Tons freight per train	1887.	1886.	Inc. or Dec.	P. c.
Miles each ton hauled	275	279	D.	4 1.4
Passengers per train	157	161	D.	4 2.4
Miles passenger journey	41	44	D.	3 6.8
	274	294	D.	1 3 5.9

Of the total number of passengers carried 420,116, or 6.12 per cent., were first-class through, 39,174, or .57 per cent. second-class through, 17,893, or .26 per cent. emigrants, 6,388,720, or 93.05 per cent., local.

The mileage was as follows:

	1887.	1886.	Inc. or Dec.	P. c.
Passenger trains	4,577,935	4,133,490	I.	424,015 10.2
Freight trains	7,935,972	7,384,814	I.	551,158 7.4
Switching trains	2,857,787	2,541,308	I.	316,479 12.4
Other trains	343,775	176,382	I.	167,393 94.9
Total	15,715,469	14,235,994	I.	1,459,075 10.2

The engine mileage was 16,025,757 miles, an increase of 1,769,363 miles, or 12.4 per cent. The average mileage of passenger engines was 43,330, and the freight 33,392, as compared with 37,422 for passenger and 28,960 for freight last year.

The cost of locomotive service was \$3,040,427, against \$2,633,185 in 1886, an increase of \$407,242, or 15.4 per cent. The expenses per mile run have increased from 18.47 cents in 1886 to 18.97 cents in 1887, or 2.70 per cent.

The earnings, including 100 per cent. of the N. Y., P. & O., and all leased lines and branches, were as follows:

	1887.	1886.	Inc. or Dec.	P. c.
Gross earnings	\$20,567,859	\$24,756,067	I.	\$1,811,792 7.3
Less proportion due lines worked on percentage basis	2,357,501	2,256,019	I.	101,482 4.4
Accruing to N. Y., P. & O.				
E. & W.	\$24,210,358	\$22,500,048	I.	\$1,710,310 7.6
Expenses	17,390,673	16,388,638	I.	1,002,035 6.1
Net earnings	\$6,819,085	\$6,111,410	I.	708,275 11.5
Mia.	940,658	946,460	D.	5,802 .6
Total net earnings	\$7,760,343	\$7,057,869	I.	702,474 9.9
Int., rentals, etc.	7,158,544	7,043,258	I.	115,286 1.6
Surplus	\$691,799	\$14,611	I.	\$587,188

The earnings of the N. Y., P. & O. were:

	1887.	1886.	Inc. or Dec.	P. c.
Freight	\$3,738,491	\$3,473,601	I.	\$264,890 7.6
Coal	1,032,119	1,065,706	D.	3,587 .3
Passengers	1,333,594	1,397,119	D.	63,525 4.5
Mails	67,105	67,149	D.	44 .07
Express	91,669	80,794	I.	10,875 13.4
Miscellaneous	72,149	76,738	D.	459 5.9
Total	\$6,365,127	\$6,161,107	I.	204,020 3.3
Expenses	4,210,001	4,109,231	I.	100,770 2.4
Net earn	\$2,155,126	\$2,051,875	I.	\$103,251 5.0
Rental	2,038,841	1,971,554	I.	65,286 3.3
Profit	\$118,286	\$80,321	I.	\$37,965 47.2
P. c. exp.	66.1	66.6	D.	.5

The mileage was as follows:

	1887.	1886.	Inc. or Dec.	P. c.
Passenger trains	1,650,548	1,632,892	D.	82,344 5.0
Freight trains	4,204,267	4,378,379	D.	174,112 3.9
Switching trains	1,271,050	1,172,255	I.	98,795 8.4
Other trains	33,862	84,868	D.	51,006 60.1
Total	7,059,727	7,268,394	D.	208,667 2.8

The cost of locomotive service on the N. Y., P. & O. was \$1,253,169, an increase of \$25,805, or 2.10 per cent.; the expenses per mile were 17.29 cents, against 16.88 cents in 1886, an increase of 2.43 per cent.; the engine mileage was 7,244,718 miles in 1887, against 7,268,394 in 1886, a decrease of 23,676 miles, or .33 per cent.

An enormous amount of work has been done relaying the main tracks with 74-lb. steel rails, continuing the work commenced in the previous year, 22,266 tons of new steel rail being used in repairs. Although this rail, weighing 74 lbs. per yard, was used to replace rail weighing 63 lbs. per yard, which in turn was used in sidings and branches, where rail weighing 56 and 60 lbs. per yard was removed, the difference has all been charged to operating account.

The condition of the track has been greatly improved during the past year, 1,006 improved frogs and 828 safety switches having been put in. The correction of the alignment of sharp curves has been continued. Two hundred and eight culverts and small openings have been closed up, and cast-iron pipe put in their place.

A system of interlocking signals and switches has been introduced whereby increased safety to passengers is assured and the handling of trains greatly facilitated; \$35,840.15 has been expended during the year for these signals, and it is expected that when they are in full operation not only will the safety of passengers be greatly enhanced, as stated, but a material saving effected in the cost of running the trains.

A large addition to the yard at Bergen Junction, and a rearrangement of the tracks and switches was made during the year at a cost of \$34,996.79. This yard has now a capacity of 1,600 cars, and when completed will be fully equal to the requirements of the present traffic. This is forcibly illustrated by the fact that whilst last year, with less traffic, there was a blockade at Jersey City and Bergen, there has not been during this year the slightest delay in the handling of business at either of those points, the key to the whole situation being Bergen yard.

The Union Steamboat Co. sold during the years 1886 and 1887 seven wooden steamers, the oldest of which were built in 1864 and the latest in 1875, for the sum of \$218,000. It was determined to build two steel steamers of the capacity of 2,800 tons each, measuring 351 feet in length and 41 feet in the beam. The "Owego" will be finished in November, 1887, and the "Chemung" upon the opening of lake navigation next spring. They will cost about \$600,000.

The fleet delivered to the Erie Railroad during the year 456,837 tons, as compared with 310,196 tons the previous year, an increase of 50.18 per cent. It also received from the Erie Railroad 75,629 tons west-bound freight, an increase of 29,926 tons, or 65.48 per cent. as compared with the previous year.

East Tennessee, Virginia & Georgia.

The first annual report of this reorganized company for the year ending June 30 was submitted to the stockholders at the annual meeting at Knoxville, Nov. 16.

The East Tennessee, Virginia & Georgia Railway acquired at judicial sale, July 1, 1886, the title to the East Tennessee, Virginia & Georgia Railroad and branches, controlling interests in the stocks of the Knoxville & Ohio, and the Memphis & Charleston, the latter being also operated by the East Tennessee, Virginia & Georgia Railroad, under a 20 years' lease, 8 of

which had expired. Notice was given by the reorganized company to connecting railroads that it was not bound by any traffic or other contracts of the old company, they having been annulled by foreclosure. No new contracts have since been made with any connecting lines.

The company owns lines from Bristol to Chattanooga, Tenn., and to Macon and Brunswick, Ga., and Selma, Ala., divided as follows: East Tennessee Division, 297 miles; Alabama Division, 377 miles; Georgia Division, 339 miles; a total of 1,013 miles operated. This includes 17.6 miles of road from Anstett to Atlanta, owned jointly with the Georgia Pacific, and 18 miles from Lauderdale to Meridian, Miss., the property of the Mobile & Ohio, over which this company runs its trains under a contract.

The company's equipment at the close of the fiscal year included 156 locomotives, 77 passenger cars, 4,627 freight and 438 other cars. Twenty of the locomotives need extensive repairs. Five passenger, 8 baggage and 865 freight cars have been purchased during the year. There yet remain to be delivered 335 freight cars of 50,000-lbs. capacity. Twenty-four consolidation locomotives are under contract.

At the close of the year the company owned 4 sleeping cars, 79 box cars, 2 officers' cars; 81 mail, baggage, express and postal cars; 4,627 freight cars, and 110 maintenance of way cars.

The balance sheet, condensed, is as follows:

Assets:	
Cost of road and equipment	\$71,187,643
Construction and equipment account	789,364
Materials, rails and ties	375,211
Stocks and bonds	5,008,651
Mobile & Birmingham R. R.	50,473
Cash	463,018
Cash held by Central Trust Co. to pay coupons	736,637
Bills receivable	23,071
Due from agents, etc.	313,676
Suspended claims	7,856
Land	2,526
	\$78,958,126
Liabilities:	
Capital stock, common	\$27,500,000
first preferred	11,000,000
second preferred	18,500,000
Bonds and mortgages	57,000,000
Bills payable	20,000,000
Due Knoxville & Ohio R. R.	149,377
Coupons due	22,544
Unpaid vouchers and pay rolls	836,882
Due agents, etc.	359,305
Profit and loss	54,745
Surplus account	522,509
Total	\$78,958,126

The earnings for the last two years were as follows:

	1887.	1886.	Inc. or Dec.	P. c.
Freight	\$3,031,179	\$2,544,706	I.	\$486,473 19.1
Passenger	1,085,936	980,093	I.	105,843 10.7
Express	77,300	67,216	I.	10,084 14.6
Mail	118,753	116,671	I.	2,082 1.2
Miscellaneous	55,004	69,603	D.	14,599 20.9
Total	\$4,368,181	\$3,778,291	I.	\$589,890 15.6
Expenses	2,901,229	2,404,312	I.	496,917 20.6
Net earn	\$1,466,952	\$1,373,979	I.	\$92,973 6.7
Gross earn. per mile	4.31	3.69	I.	1.62 43.4
Maintenance of way	1.421	1.331	I.	.090 6.9
Per cent. of expenses	68.4	63.6	I.	4.8

The expenses were divided as follows:

	1887.	1886.	Inc.	Decrease.
Conducting transportation	\$426,059	\$708,455	I.	\$57,703
Motive power	669,260	747,729	I.	121,531
Maintenance of way	788,943	551,610	I.	237,335
Maintenance of cars	217,161	168,905	I.	50,258
General expenses	199,892	109,713	I.	30,089
Total	\$2,901,229	\$2,404,312	I.	\$496,917
Divided between passenger and freight:				
Freight	\$1,961,607	\$1,585,635	I.	\$376,032
Passenger	939,562	818,677	I.	120,885

The traffic was divided as follows:

	1887.	1886.	Inc.	P. c.
Passengers carried	830,196	730,983	I.	99,213 13.5
one mile	42,765,468	38,655,764	I.	4,109,714 10.6
Tons freight carried	1,946,980	1,524,926	I.	412,054 26.8
one mile	294,677,561	221,906,324	I.	72,771,237 32.7

The earnings and expenses per train mile were as follows, in cents:

	1887.	1886.	Inc. or Dec.	P. c.
Passenger earnings	95.77	91.41	I.	4.8
" expenses	68.73	62.43	I.	10.8
Net earnings	27.06	28.99	D.	6.6
Freight earnings	125.49	114.95	I.	9.1
" expenses	80.48	70.06	I.	13.9
Net earnings	45.01	44.20	I.	1.6

Per passenger per mile, the earnings and expenses for three years were as follows, in cents:

	1887.	1886.	1885.
Earnings	2.530	2.53	2.53
Expenses	1.82	1.80	1.85
Net	0.719	0.73	0.68

And per ton per mile they were:

	1887.	1886.	1885.
Earnings	1.03	1.14	1.19
Expenses	0.68	0.71	0.79
Net	0.36	0.43	0.40

The cost of maintenance of cars per mile run was, in cents:

	1887.	1886.	1885.
Passenger	1.038	0.878	0.943
Freight	0.352	0.282	0.287

The cost of motive power per mile run was, in cents, including the allotted proportion of switching and working train expenses:

	1887.	1886.	1885.
Passenger service	18.179	18.715	18.826
Freight service	25.465	22.384	24.967

The expense of maintenance of way per train mile was, in cents:

	1887.	1886.	1885.
20.736	15.515	15.183	

The average haul was 151.3 miles; the average revenue per passenger per mile was .0254 cent, and of freight per ton per mile .0103 cent; the local tonnage has increased 26.5 per cent.

There were transported during the year 561,721 tons of coal and coke, 250,758 tons of lumber, 175,374 tons of iron and iron ore, 108,589 tons of cotton, 83,781 tons of grain, 49,188 tons of flour, 46,200 tons of turpentine and rosin and 29,771 tons of marble.

At the close of the fiscal year there was on the Main Line

792 miles of steel rail, 145 miles of fish-bar iron and 77 miles of chair iron; 318 miles of the road are fully and 18 partially ballasted.

Six thousand tons of steel rail will be required during the coming year; it is recommended by the General Superintendent that 7,000 tons of 65-lb. steel rail be purchased for the East Tennessee Division, relieving 6,000 tons of 56-lb. steel.

The President, in his report, says: The Eastern terminus of the company's lines at Bristol and Paint Rock giving competitive Eastern outlets via the Norfolk & Western and Richmond & Danville, your Board adopted the policy, which has since been maintained, of throwing open its lines on the same basis to each of its Eastern connections. This policy, it is believed, has contributed to the increased volume of business of your company during the year 1887. These Eastern outlets being ample and satisfactory, your Board has not at any time contemplated extensions into the territory of either the Norfolk & Western or Richmond & Danville companies. Your company has also two natural connections to Cincinnati, the Cincinnati Southern and the Kentucky Central, but the latter could not be utilized until the Ohio River bridge from Covington to Cincinnati should be constructed. To secure its early completion this company subscribed, and has since paid, \$100,000 to the company formed for the building of the bridge. In order to shorten the connection with the Cincinnati Southern and to develop the company's large and profitable coal carrying business, as well as to satisfy the demands of the people of Knoxville for a Northwestern outlet, your company decided upon the acquisition and completion of the Walden's Ridge Railroad, extending from Clinton, on the Knoxville & Ohio Railroad, to Emory Gap, on the Cincinnati Southern, including its coal branches, being about 50 miles in length, and caused to be projected and surveyed in its interest an extension of this line from Emory Gap down the Sequachee Valley to South Pittsburgh, and thence up the Tennessee River to Chattanooga. Simultaneously the Memphis & Charleston resolved to extend its line from Stevenson to South Pittsburgh, so that the new line, when constructed from Chattanooga via South Pittsburgh to Stevenson, would give your company a line under its own control from Chattanooga to Stevenson, relieving the Memphis & Charleston from a rental of \$60,000 per annum, now paid the Nashville, Chattanooga & St. Louis for trackage over 38 miles between those points, and securing a maximum grade of 20 ft. per mile, in place of grades of about 70 ft. over which the Nashville, Chattanooga & St. Louis is operated. The entire line from Chattanooga to Stevenson has been surveyed, much of the right of way secured, and preparation has been made to let the work of construction.

As under the laws of the state of Tennessee, the Board of Directors were authorized to purchase such roads as it deemed to be to the interest of the company, and issue the company's bonds in payment therefor, and secure the same by mortgage; and inasmuch as it would be necessary for the company from time to time to construct various other branches and extensions to the new cities and industries growing up in the iron and coal regions of Tennessee, Georgia and Alabama, it was decided that all bonds issued for such purpose should be of one series, secured by a single mortgage. The Board therefore authorized the execution of a mortgage securing so many of a series of fifty year 5 per cent. gold bonds as from time to time it might be found necessary or advisable to issue for such purposes, not exceeding \$15,000,000 in aggregate amount, or \$20,000 per mile of completed road acquired. Up to this time the issue so authorized has been limited to \$1,000,000 for the acquisition of the Walden's Ridge Railroad and branches.

The minority stockholders of the Memphis & Charleston have for some years carried on legal proceedings looking to the abrogation of the lease by which the East Tennessee, Virginia & Georgia operated the Memphis & Charleston. Inasmuch as the ownership by this company of a majority of the Memphis & Charleston stock made it desirable that the interest of all stockholders should be promoted in every way possible, your company was satisfied to have a decree entered canceling the lease, which was done on April 29, 1887, in the Chancery Court, at Memphis, Tenn., and thereupon the East Tennessee, Virginia & Georgia Railway Co. turned over all the leased railroad and property to the Board of Directors and officers of the Memphis & Charleston Railroad Co., by whom it has since been operated.

As your company's lines in Alabama terminate at Selma, 150 miles from the Gulf at Mobile, with the branch extending westward to Meridian, Miss., it was determined to extend such lines to Mobile, Ala., from which point trackage could readily be secured to New Orleans. In February, 1887, the Board of Directors, under authority of the laws of Alabama, agreed on behalf of this company that it would guarantee an issue of \$20,000 per mile of 5 per cent. 50 year gold bonds on the Mobile & Birmingham Co.'s road, from Mobile to a connection with this company's line near Selma, in consideration of the delivery to it of a controlling interest, being a majority of the entire capital of the said Mobile & Birmingham Railroad. By the assistance thus afforded, the Mobile & Birmingham has been enabled to prosecute its work of construction so that it will be able to open its line from its connection with this company's line near Selma to Mobile during the year, and some progress has also been made toward an extension from a point on the Alabama Division near Brierfield to a connection with the Georgia Pacific Railroad near Birmingham.

During the fiscal year a majority of the first preferred stock of this company was acquired by the Richmond & West Point Terminal Railway & Warehouse Company, and a majority of the Board of Directors was named by that company. The year's experience has shown that the effect of this change upon the operations of this company is to secure harmonious relations with the entire system of railroad controlled by that company, including maintenance of rates and the prevention of building extensions by one company into the territory of the other. In all other respects the affairs of the East Tennessee, Virginia & Georgia have been and will be continued to be managed as if no such acquisition had occurred.

There has been expended during the year, in addition to the betterments charged to operating expenses, for construction, \$414,590.00, and for equipment, \$374,773.32.

A large percentage of the traffic of the Southern railroads is competitive with water lines, either directly or indirectly, and the rates on such traffic are therefore not under the control of the managers of such railways. When the Inter-state Commerce Law went into effect, it was feared that the fourth, or so-called "long and short haul" section of the law would be so construed as to practically prohibit the railroads from competing with the water lines. The enforcement of the law in accordance with this construction would have ruined a large number of the railroads of the South, and would have produced widespread commercial disaster in that section of the country. Happily these disasters have so far been averted by a rational construction and a wise administration of the law on the part of the able Inter-state Commerce Commissioners.

A new co-operative fast freight line has been established and is now in successful operation in connection with the Richmond & Danville system of roads, for the transportation of freight between eastern cities via West Point, Paint Rock and points accessible by means of the company's road and its connections.